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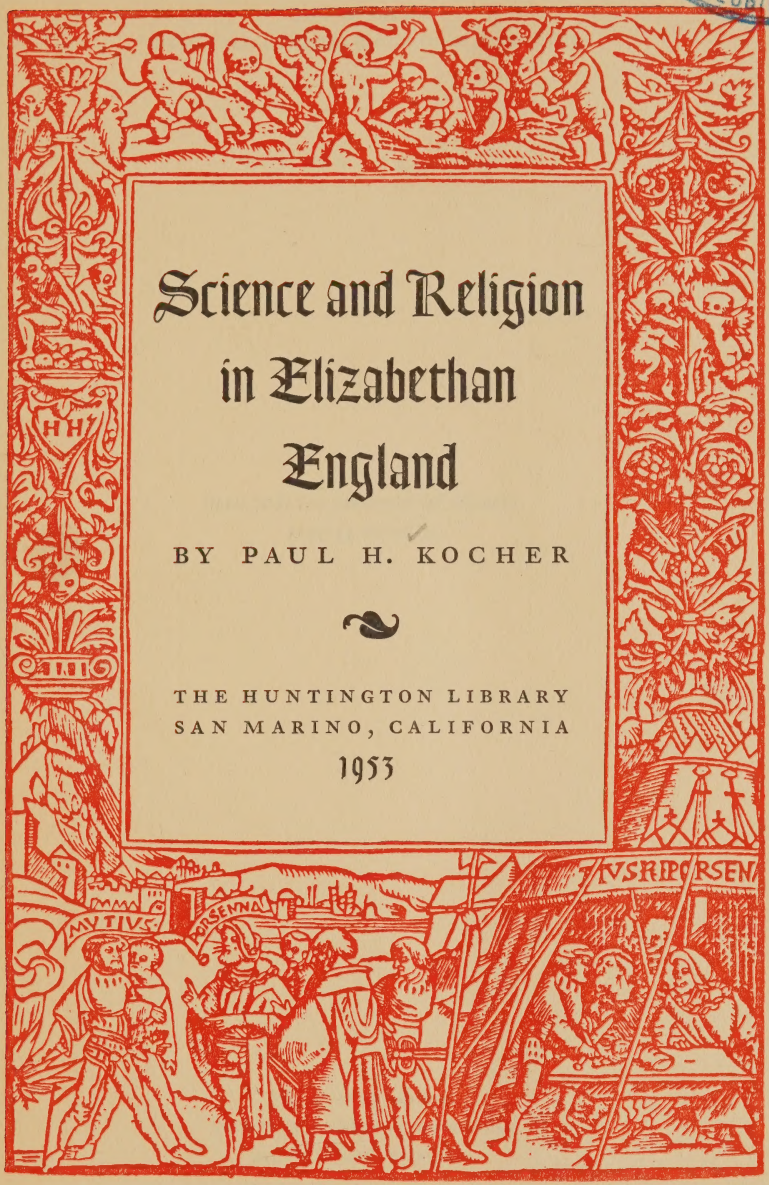

Science and Religion in Elizabethan England

BY PAUL H. KOCHER

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1953

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DESIGN BY JOSEPH SIMON

TO MY FAMILY

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Preface

Did science and religion conflict in Elizabethan England? This was the central question which I set out to answer when beginning research for this book. It soon became clear, however, that the question was too narrow. If on some points Elizabethan divines and scientists differed, on many others they entirely agreed, while on still others their ideas entwined with each other and with ideas from related fields in complex patterns. Evidently the real need was to discover in a larger and more generous way what were the areas of harmony as well as tension between them, and why. Also, how did these areas connect not only with one another but also with the surrounding life and thought of the times? The present study, therefore, is more than a chronicle of conflict. It looks for peace as well as for war, and for the broader meaning behind both. It seeks to analyze, as dispassionately as may be, how Elizabethan Christianity and science impinged upon each other, and in so doing affected other attitudes, in a number of key topics ranging widely from medicine to astrology, from Satan to the new world in the moon. Such an inquiry into the problems of the past has a sufficient value in and for itself, but I should be disappointed if it did not also help our understanding of certain modern problems largely descended from them.

There are several things which this book is not. It is not a history of Elizabethan science; it takes account only of those scientific practices and developments which bore in some way upon contemporary religion. Likewise it is not a history of Elizabethan theology or of ecclesiastical controversies, or indeed a history of anything in the sense of a sequential chronological approach. It is a study of the mutual interplay of two great human attitudes, scientific and religious, at a specific place and time. Its method is analytic. In the main I have tried to present this

interrelationship as the Elizabethans saw it and to define its issues in their terms, not my own. But where the Elizabethans did not grasp (as what age does?) the full implications of what was going on in their own time, especially in science, there can be no shirking the task of clarifying these as well as possible in the light of our later knowledge.

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Source materials for so complex a study are bound to be vast in quantity and scattered through almost every sort of Elizabethan publication: chiefly in scientific works and in theology learned or popular, but also to a considerable extent in belles lettres, in philosophy, and in that huge amorphous mass of writing which was everything in general and nothing in particular. It cannot all be cited in toto. Selection being imperative, the only recourse was to try to select widely, wisely, and representatively, and to give preference in limited footnote space to primary over secondary sources. There are of course untold thousands of secondary books and articles touching upon one facet or another of Elizabethan religion or of Elizabethan science. From among those known to me I have cited only titles dealing most directly and importantly with the ground common to both subjects.

The sheer size of the topic, if it is to be covered in one readable volume, also requires seven-league boots for traversing some parts of it. For example, the first four chapters are full of brief summaries of basic Elizabethan ideas about skepticism, the aims of knowledge, the world's decay, and so on. Such ideas are too big to be treated fully here, yet too closely linked with both science and religion to be omitted. The important thing is to see these links and their consequences. Similarly, later chapters often give mere sketches of certain familiar scientific or religious doctrines of the period, concentrating then on a study of the ways in which particular groups and individuals among the clergy or the scientists or the community at large interpreted such doctrines and applied them in practice. Particularity within generality is the ideal aimed at.

The temptation, consequently, has been to include separate chapters on some of the more interesting personalities like Francis

Bacon, John Donne, Edmund Spenser, and the rest. But such a course would have called for an additional volume, which may yet be written. Moreover, it would have emphasized biographical and literary problems, and would have broken too sharply the continuity of a general analysis. Instead it has seemed best to bring in the views of these giants, and of many lesser men from other fields, only when they served to illustrate the topic under discussion. In a sense, then, I have usually used individuals to clarify general issues, not vice versa.

Books are the fruit of infinite rejections. This one might have been written in half a dozen other ways, from other points of view, with other purposes. But as Goethe remarked, the unlimited possible must finally be surrendered for the limited actual. Research has convinced me that the Elizabethans, since they were fundamentally Christian, saw the problem of relating their religion to their science as really a problem in rightly conceiving the relation between eternal spirit and temporal matter. These are the two grand underlying metaphysical data. The present study is organized upon this Elizabethan concept, with which my own Christian belief (bias, some would say) also makes me sympathize. Chapters fall into four main groups. Group one, consisting of the first four chapters, deals with the problems of knowledge in so far as they are connected with Elizabethan science and religion. The chapters on Providence and on Satan constitute group two and treat the operations of spirit in the world of matter. In the third group the chapters on cosmology show how the new science changed Elizabethan concepts of that world, calling for adjustments in faith. And the remaining chapters cover in one aspect or another the multiple doctrine of man the composite, who unites in himself the two orders of matter and spirit.

The period intended by the term *Elizabethan* is roughly from about 1550 to 1610, that is, from just after the publication of Copernicus' *De Revolutionibus* (1543) to the beginning of Galileo's work. But I have spilled over a good deal at both boundaries. Such limits are merely convenient approximations. The scene under description is England, and English writings are therefore

of prime interest as indications of English thought. Nevertheless, foreign works read in England, especially if translated into English, give materials of almost equal importance and are freely cited here. For the sake of flavor it has seemed worth while to preserve the original spellings of quotations and titles, save for modernization of all j and v forms. Principal words in all book titles are uniformly capitalized.

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Work on this study was begun under a fellowship from the John Simon Guggenheim Memorial Foundation in 1946-47 and brought close to completion under a fellowship from the Huntington Library in 1950-51. To the trustees of both these great foundations I wish to express my heartfelt gratitude, knowing that without the help of the one this book could never have been begun and without that of the other perhaps never completed. I likewise owe more than can well be expressed to my wife, who during the intervening years of work has given me all aid and comfort of hand, head, and heart, from typing and checking to criticism and encouragement. It has been a long journey, and I am glad not to have had to make it alone. Also most helpful has been the friendly interest of the Huntington Library staff, notably that of Mr. Godfrey Davies and Miss Mary Isabel Fry. I owe Mr. Davies particular thanks for his suggestions upon the manuscript.

Four of the chapters have previously been published as separate articles in *The Huntington Library Quarterly* and *Journal of the History of Ideas*. The editors of those journals have kindly given permission to republish them now in revised form.

PAUL H. KOCHER

Claremont, California
December, 1952

Science and Religion in Elizabethan England

I

Elizabethan Science, Handmaid or Mistress?

THE FINAL attitudes of Elizabethan churchmen towards science were compounded of some hopes and many deep anxieties. Science seemed a Caliban, indispensable in service but sometimes ignorantly ambitious to take over the whole island. This dilemma of the clergy went back ultimately to a metaphysical dualism pervading all Elizabethan thought. Religion dealt with spirit, science with matter. Spirit, according to Christian theology, operated in matter yet was not matter and emphatically must not be confused with it. Science as a study of matter had value in disclosing something about the three orders of spirit—God, the angels, and man's soul. It could lead to a more broadly based and rational piety. Yet such a study must not clash with what the Supreme Spirit had revealed about himself and the whole kingdom of the spiritual. Some measure of scientific technology in at least the fields of agriculture, manufacture, medicine, and navigation was obviously essential to life on earth. Yet it must never be allowed to distract men from the overriding need for salvation.

Above all, so thought the Elizabethan clergy, it must not, by puffing up the pride of the scientist and those who learned from him, or by engrossing them in the investigation of the material world, lead them to doubt, deny, or denigrate the existence or primacy of the world of spirit. For this was atheism in its many varieties. The Anglican divine, Thomas Jackson, was speaking for all clergymen of all faiths in the period when he expressed in his *Treatise of Unbelief* (1625) a fear that too often

> doth the curious speculation of creatures visible divert the minds of many from the invisible creator unto whom the sight of these by na-

ture not misleveled by inordinate or unwildy appetites would direct all.[1]

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Here seemed to be the nub of the difficulty: of itself science was unobjectionable, even praiseworthy, but when directed by inordinate appetites it might inflict the gravest harms on religion. On their estimate of whether the harms outweighed the helps or vice versa depended in large measure the reactions of individual churchmen.

For, so far as I can discover, these reactions, at least in England before 1610, were by individuals rather than by creeds. In other words, there was nothing in the dogmas of Catholicism, Anglicanism, or Puritanism which made any one of them more or less favorable to science in general than any of the others. Doctrinally, all were equally vulnerable or invulnerable to the insinuations of science; all could equally be served by it. Within each creed there was the same wide range of opinion between individual divines and, as will become clear, the same majority conclusion that science should be welcomed as a faithful handmaid of theology. Other considerations of ecclesiastical organization, lay intervention, economic alliances, and so forth did indeed enter in to make Puritans more hospitable than Anglicans, Anglicans perhaps than Catholics, to the solicitations of the new science as distinguished from the old. But on purely theological and moral grounds the three religions did not really differ one from another in their judgments of science in general. We may look briefly at each, remembering that like other Elizabethans the clergy thought of science ("natural philosophy") as merely one branch on the whole tree of human knowledge ("philosophy") and that they often included the former implicitly in what they said about the latter.

I

The Catholic past included, of course, forces both pro- and anti-scientific. In the latter vein, though even more broadly directed,

[1] P. 45; see also Peter de La Primaudaye, *The French Academie*, Part I (1594), chap. 15, pp. 152-53; Calvin, *Commentarie upon Genesis*, tr. Thomas Tymme (1578), p. 18. In all citations of both primary and secondary sources throughout the book the place of publication is London unless the contrary is specified.

were the declarations of Tertullian and his school that philosophers had always been the patriarchs of heresy and that Christians were better off without worldly studies of any kind.[2] Jerome dreamed a famous dream that he was condemned to hell for being a Ciceronian. And to be a student of Cicero was inevitably to encounter in that master eclectic a full harvest of the leading ideas in ancient philosophy and science. Pope Innocent III's *De Contemptu Mundi* (in English, 1576) displayed the vanity of all such earthly studies. Ultimately this attitude rested on the strictures of St. Paul in Colossians 2:8 and elsewhere: "Beware lest any man spoil you through philosophy and vain deceit."[3]

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Science here suffered under the stigma common to all mundane knowledge when the world seemed but a hideous interlude before heaven. The Richard Rolles of the Middle Ages had to be laid asleep in body before they could become souls living in God. And in the fifteenth century the reaction from extreme scholastic intellectualism produced the simple otherworldly yearnings of men like Thomas à Kempis. Some of these writers were translated into English in the sixteenth century, and many others were freely quoted.[4] They filled in Elizabethan religious life a need transcending differences of creed. Nor was the mystic devotional note silent in contemporary Catholicism. The meditations of Caspar Loarte and Cardinal Bellarmine, given English garb,[5] came in from abroad to join those of Robert Parsons' *The First Book of Christian Exercise* (1590) and the passionate self-immolations of the recusant poet Robert Southwell. Most of this was a-scientific rather than directly anti-scientific. But the two are often akin; obliviousness of science blurs gradually into contempt of science.

[2]Etienne Gilson, *Reason and Revelation in the Middle Ages* (New York, 1938), pp. 5-11. The saying is quoted by Henry Bullinger, *Decades*, ed. Thomas Harding (Cambridge, 1849-52), Parker Society, IX, Decade 4, Sermon 3, p. 124. Parker Society publications are given the Library of Congress volume numbers. All were published at Cambridge.

[3]Also 1 Cor. 1:21, 25; 3:18-19; Romans 1:22.

[4]Pope Innocent III was twice translated, and Thomas à Kempis at least six times, each translation going through many editions.

[5]Loarte, *The Exercise of a Christian Life* (1584?); Roberto Bellarmino, *The Art of Dying Well* (1622).

Science is thisworldly. A whole-hearted Christian otherworldliness was and is one of its subtlest and deadliest alternatives. In the Elizabethan age as in earlier ages, this psychology of otherworldliness issued intellectually in the doctrine of fideism, the advocacy of faith as against reason.

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Per contra, rational theology does not forget the earth but strives to tie it to heaven by a golden chain of reason and knowledge. Mighty and enduring were the links forged by Aquinas and other great scholastics. The English Catholic humanists during the reign of Henry VIII were of course likewise great lovers of learning, whether scientific or otherwise. Sir Thomas More gave science a place of honor in his *Utopia* (1516),[6] and went up on his rooftop to observe the stars. Linacre practiced medicine and translated Proclus' *De Sphaera* and numerous works of Galen. Later, leading the Counter Reformation, the Jesuits gained the respectful hatred of their Protestant adversaries throughout Europe by taking almost as much of knowledge to be their province as did Francis Bacon. One of their English representatives, Robert Parsons, in his *The Seconde Parte of the Booke of Christian Exercise* (1590), did not scorn to mix arguments from science with arguments from metaphysics to prove the existence and attributes of God.[7]

In fact, Elizabethan Catholics competed vigorously with Protestants for the title of being the greater champions of learning. When Protestants voiced the familiar taunt that, because of their delay in translating Scripture for the masses, Catholics believed ignorance to be the mother of devotion, Thomas Stapleton in *A Fortresse of the Faith* (1565) retorted that Lutheran reversion

[6]Tr. Ralph Robinson, English Reprints (1869), Bk. 2, p. 119-20: God has made "the marvelous and gorgeous frame of the world for man with great affeccion intentively to beholde.... And therefore he beareth (say they) more goodwil and love to the curious and diligent beholder and vewer of his woork and marvelour at the same, then he doth to him, which like a very brute beaste ... hathe no regarde to soo greate and soo wonderfull a spectacle. The wittes therefore of the Utopians inurede and exercised in learnynge, be marveilous quycke in the invention of feates helpinge annye thinge to the advantage and wealthe of lyffe."

[7]Pp. 46-49.

to the early Fathers and scorn of the medieval heritage caused a neglect of all learning: "Hereuppon not only writers of divinitie as the Canon lawe, but also philosophers, yea and bookes of humanite were burned apase in Germanye: common scholes ceased for certain yeares, only Scripture was studyed."[8] Bishop Stephen Gardiner charged that Protestants "have no lerninge, they have not studied for knowledge."[9] Cardinal William Allen in his *Apologie of the Two English Colleges* (1581) defended the English seminaries at Rheims and Rome as more scholarly than Oxford and Cambridge. The seminaries, he said, intended

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> to draw into this College the best wittes out of England that were either Catholikely bent, or desirous of more exact education then is these daies in either of the Universities (where, through the delicacie of that Sect, there is no art, holy or prophane, throughly studied, and some not touched at all).[10]

Adding the fact that the Catholic version of the doctrine of original sin was less severe than the Protestant and conceded to man greater residual abilities, we may conclude that the theory of Catholicism was as favorable to science as that of any other Elizabethan religion. But because of their small numbers and persecuted state the recusants had no great part in the growth of science under Elizabeth. Whether English science would have gone ahead as rapidly if the Reformation had never taken place is a nice question but in the realm of speculation. Whether its actual advance was proportionately faster than in the continental countries which remained under Catholicism is a question also fascinating but complicated by situations political, economic, social, far beyond my present purview. The unhappy fact, however, is that the Catholic Church set up an index of prohibited books and imprisoned its Galileo, whereas neither the Anglicans

[8]Fol. 67r.

[9]Quoted in the *Answer to Stephen Gardiner* (1547), fol. 22v, by Anthony Gilby, who retorted for the Protestants, "God hath indued us wyth the knowledge of the latine, greke, and hebrue & al other sciences, far, above that you had when you were in the scholes."

[10]Fol. 22r.

nor the Puritans did anything of the kind. No doubt there were divines in England who might have liked to pursue the same course, but there was no official, concerted church action of any kind, even to the extent of a censorship against science. Probably this difference in the Catholic attitude is best explained by the authoritarian and traditionalist cast of the Roman clergy, by their deeper commitment to a scholastic philosophy built on the old science, and not least by the weakness of any informed Catholic lay opinion favorable to the new.

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II

If we turn now to the continental reformers, Luther cannot be described as enthusiastic about science. For the most part he paid no attention to it. Using astronomical theories in his *Commentary on Genesis* the best he could give was the grudging acknowledgement that "it is well becoming us to know these arguments."[11] What impressed him most, in *A Commentarie upon the Fiftene Psalmes* (tr. 1577), was the danger that science would make men arrogant:

> Here it appeareth that at the beginning there was planted in man by God him self, a knowledge of his creatures & a law how to rule & govern them, a knowledge of husbandry, of phisicke, and of other artes & sciences. Afterward men of excellent wit by experience & great diligence did encrease those gifts which they had by nature. And this is but the strength of humane wisdome created in man at the beginning in Paradise. Wherfore ye holy Ghost careth not for these things: only he doth approve them as excellent giftes and treasures necessary for mans life, and sayth: All these thinges are of my creation... For by the fall of *Adam* nature is so corrupt, that it can not see the good giftes of God to be giftes in deede: but the politike heade thinketh that he enjoyeth all thinges by his owne wisedom and policie.[12]

[11]Ed. J. N. Lenker (Minneapolis, 1904), p. 79; also pp. 67-73. Elsewhere (p. 42) Luther said that Moses was a far better teacher than the philosophers, but his ultimate position seems to have been that where Moses was silent or obscure the philosophers might speak.

[12]Pp. 129-30. See also Luther's admission that learning was necessary to the interpretation of Scripture: "I am convinced that pure theology cannot

Science, as he saw it, could not contribute to salvation. It might on the contrary contribute to damnation through pride. But it was a gift of God. Therefore it must be allowed a place somewhere on the edge of limbo.

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The great difference between Luther and Calvin here was that Calvin believed science could make a genuine contribution to man's understanding of God, though still falling short of the revealed knowledge necessary to eternal life. Consequently throughout his works he took a more positively favorable view of scientific investigation. Typical is this opening passage of the *Institutes* (1536) showing that the most unlettered of men could see something of God through nature, but the student of science could see more:

> But truely they that have digested, yea or but tasted the liberal arts, being holpen but by the ayde thereof, doe proceede much further to looke into ye secrets of Gods wisedom. Yet is there no man so hindred by lack of knowledge of those arts, but that he throughly seeth abundantly enough of cunning workmanship in Gods works, to bring him in admiration of the workeman thereof. As for example to the searching out of the movings of the starres . . . there needeth art & an exacter diligence: by which being throughly perceived, as the providence of God is the more manifestly disclosed, so it is convenient, that the mind rise somewhat the higher thereby to behold his glorie. But forasmuch as the unlearned people . . . cannot be ignorant of the excellencie of Gods cunning workmanship . . . it is evident that there is no man to whom God doeth not largely open his wisedome.[13]

He went on to pay the same tribute to the "singuler sharpnes of wit" required "to wey with such cunning as Galen doth, the knitting together, the proportional agreement, the beautie & use

---

exist without knowledge of the sciences, as hitherto it has lain prostrate with their fall. Yea, I see that a revelation of the divine word would never have been made but for the rediscovery of languages and sciences," as quoted by G. H. Gilbert, *Interpretation of the Bible* (New York, 1908), p. 189. Expressions of general hostility to philosophers are to be found scattered through Luther's works but, so far as I can see, in contexts applying to faith and morals.

[13]*The Institution of Christian Religion,* tr. Thomas Norton (1587), fol. 6r & v; also 8or ff.

in the frame of mans bodie," though the essentials of the proof, he thought, were evident even to the untrained.

Later in the *Institutes* came the crucial distinction between the total ruin wrought by original sin on man's moral and religious faculties and the only partial corruption of his practical intellect, a distinction which saved Calvinism from skepticism about natural science. It allowed Calvin to vent his warm enthusiasm for the achievements of science even among the pagan and unregenerate ancients:

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> So oft therefore as wee light uppon prophane writers, let us be put in minde by that marvellous light of trueth that shineth in them, that the wit of man, howe much soever it be perverted and fallen from the first integritie, is yet still clothed and garnished with excellent giftes of God. If we consider that the spirite of God is the onely fountaine of trueth, we will neither refuse nor despise the trueth it selfe, whersoever it shall appeare, except we wil dishonourably use the spirite of God . . . Shall wee say that they were madde, which in setting foorth Phisicke, have employed their diligence for us? What of all the Mathematicall sciences? shall wee thinke them doting errours of madde men? no, rather wee cannot read the writings of the olde men, concerning these things, without great admiration of their witte.[14]

Nor was this doctrine, so incalculably important for the future of science in England, limited to the *Institutes*. For example, in his *Commentarie upon Genesis* (1578) Calvin declared that those who neglect the knowledge of God which may be attained through a study of his works are as guilty as those who, studying only the works, neglect the God who made them. "Both do amisse."[15] There is a duty to search the divine evidence of nature. And his *Admonicion Agaynst Astrology Judiciall* (1561) reiterated that God has raised up the human sciences.[16]

If ideas have any influence on conduct—and they do—then it was lucky for Elizabethan scientists that the prevailing climate of theology in which they worked had been set by Calvin and transmitted to England by the writings and personal influence of men like Theodore Beza and Henry Bullinger who shared his

[14]Fol. 81r & v. [15]Pp. 18-20. [16]Sig. A5v.

opinion that science did more good than harm to religion.[17] A humble yet influential member of this group was the Genevan pastor Lambert Daneau, whose books were well known in England. Representatively, in *The Wonderfull Woorkmanship of the World* (1578), he contended that when St. Paul in Romans and Colossians forbade men to follow vain philosophy and the world's wisdom he did not mean that kind of learning "whiche discreetly and as farre as neede requireth, discourseth of the causes of thinges."[18]

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III

Whether because of this Calvinist legacy or because the first leaders of the English Reformation, recruited from the Cambridge and Oxford humanists, naturally favored learning,[19] or from other causes even more deeply rooted in the English temperament and environment, most Anglican divines welcomed, but with reservations, the increasing stores of human science. From their point of view, everything depended on the way in which this science was approached and applied. If directed to the glory of God and the relief of man's estate, well and good. But if erected as an altar of self-esteem, a source of heresy and disbelief, then nothing could be worse. This was the gist of Thomas Becon's stipulation in *A New Catechism* (1563) that mundane studies not be

> mates with God's word, but rather handmaids unto it, and serve to set forth the honour and glory thereof. For unto this end should all liberal sciences to be studied and learned, even that they might not depress but avance the true religion of God. For eloquence without godliness is as a ring in a swine's snout; yea, all arts and sciences, not coupled with the love of religion, are rather instruments of wickedness than of godliness.[20]

[17]Theodore Beza, *Job Expounded* (1589?), Preface, sigs. B1v, B5v ff.; Bullinger, Decade 4, Sermon 2, pp. 98-99.

[18]Fol. 4r & v.

[19]See M. M. Knappen, *Tudor Puritanism* (Chicago, 1939), p. 36.

[20]Ed. John Ayre (1844), Parker Society, III, 382; also pp. 18, 350, and the Preface to his *Governance of Virtue* (1566; 1st ed. 1549), ed. Ayre, Parker Society, II. Cf. Bishop James Pilkington's praise of nature as a means of knowing God, *Works*, ed. James Scholefield (1842), Parker Society, XXXV, 146.

In the same fashion Miles Coverdale's *Shorte Recapitulation . . . of Erasmus Enchiridion* (1545) accepted the Christian humanist idea that the liberal sciences, including mathematics and astronomy, were aids to religion, but he was much troubled by their potential hazards:

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> To be short, all manner of learning should be tasted in due season and measure, with good judgment and discretion, under the correction of Christ's doctrine; so that the wisdom of God be above all other . . .
>
> . . . As for example, conning or learning must be loved for Christ's sake. . . . For better it is to have less knowledge and more love, than much to know, and not to love. Thus every thing, so far forth as it helpeth most unto virtue, ought chiefly to be applied. But rather ought we to lack them, than that they should hold us back from Christ. . . .[21]

And Bishop John Jewel believed learning and religion so necessary to each other that "neither might be without the other."[22]

Out of these general pronouncements it is not always easy to winnow the views of particular Anglican divines about natural science specifically. Sometimes the context shows that they were thinking primarily of the dangers and benefits of the classics to Christianity, but even the classics would comprise a good deal of ancient natural philosophy, notably in Plato, Aristotle, Cicero, Lucretius, and Pliny. At other times the context indicates that the clergy were thinking of human studies in the mass, including science but emphasizing it no more and no less than any of the others. This was in fact the normal Renaissance way of looking at science. It was a subdivision of philosophy, and in the university curriculum it constituted, in the form of mathematics and astronomy, a part of the seven liberal arts. In those days before intensive professional specialization and the flowering of the experimental method, science sat fairly quietly among its brothers and sisters in the family of knowledge, not in feared and honored

[21] *Writings and Translations of Myles Coverdale,* ed. George Pearson (1844), Parker Society, XIII, 498, 509-10.

[22] John Jewel, *Certaine Sermons* (1583) in *Works,* ed. John Ayre (1845-50), Parker Society, XXIV, 980, 982-83. But contrast his *Defence of the Apology of the Church of England* (1562), ed. Ayre, Parker Society, XXVI, 877-79.

isolation at the head of the table as it too often does today. The clergy, as later chapters will show, recognized it as raising some serious dangers peculiar to itself. But frequently they preferred to discuss those problems which it shared with other worldly learning in contrast to religion.

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Still, some fairly specific views can be found. Bishop John Hooper (if so intransigeant a leader of reform may be considered Anglican) had the highest opinion of geometry and arithmetic, which he held "necessary for every man . . . gifts of God, and to be honoured, because they come from him only, that giveth all goodness. Jac. 1."[23] Against those who thought it harmful to piety, logic was defended by Roger Hutchinson in his *Image of God* (1550) as "an excellent gift of God, not to be despised."[24] St. Paul in Colossians, he thought, did not mean to discredit all philosophy since he himself was "a great philosopher," but only such as "went about to hinder the Gospel." In other words, the method of its use was crucial. Astronomy also was widely hailed as an aid to piety, at least before Copernicanism began to cause trouble in England early in the seventeenth century.

Details about clerical attitudes in each science will be kept for the appropriate chapters. To generalize in advance, however, we may say that the dangers inherent in worldly learning did not frighten the Anglican clergy as a body into rejecting it. Richard Hooker, the foremost exemplar of the Anglican *via media*, envisioned in Baconian style such possibilities for increasing "the right helps of true art and learning" that "there would undoubtedly be almost as great difference in men therewith inured, and that which now men are, as between men that now are and innocents."[25] Yet it did not occur to him that the added knowledge would bring an added hazard to religion. And the whole Anglican position was brought to a head in the official *Homilies* (1569) by the

[23]*Early Writings of John Hooper*, ed. Samuel Carr (1843), Parker Society, XX, 330; also p. 308.

[24]Pp. xvi-xvii.

[25]*Laws of Ecclesiastical Polity*, in *Works*, ed. John Keble (Oxford, 1888), IV, 167.

declaration concerning Scripture study, that "although other siences be good, and to be learned, yet no man can deny, but this is the cheefe, & passeth al other incomparably."[26] In other words, so long as it did not challenge the supremacy of religion, natural science, along with other human acquisitions, was recommended.

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IV

The Puritan position was not essentially different, so far as theory went.[27] Many shades of emphasis were represented. Richard Greenham thought that they were on the road to heresy who "under the pretence of knowing nothing but Christ, condemne all humane learning, arts, and sciences, all manuall professions . . . as though a man were the more holie for not using these outward meanes."[28] In Galatians 6:14 and 1 Corinthians 2:2, said Greenham, St. Paul did not mean that he wished to know nothing but Christ crucified, merely that this was principally to be known. John Downame in his *Second Part of Christian Warfare* (1611) gave one of the fullest and best contemporary expositions of the entire problem.[29] The arts and sciences were good in themselves but bad if abused, as they often were in any one of four ways: (1) Making men so arrogant as to forget God the giver; (2) Resting on mere speculation without practice; (3) Becoming the summum bonum of some lives; (4) Leading to an insatiable search for and hoarding up further knowledge. So

> in the meane time utterly neglecting the study of the Scriptures, which alone are sufficient to make them wise to their salvation: it puffeth them up with pride . . . to despise the simplicitie of the Scriptures, and to esteeme the preaching of the Gospell mere foolishnesse. . . . In so much as it may truly be said, that as pride is the father, so this worldly learning is the mother of all dangerous errors and damnable heresies: and seldome (as one saith) have there been any great errors, which have not been the offspring of great wits.[30]

[26]Sig. A6r. See also John Deacon and John Walker, *Dialogicall Discourses of Spirits and Divels* (1601), p. 13.

[27]Knappen, pp. 466, 476-78.

[28]*Workes* (1612), pp. 365-66.

[29]Chaps. 10 and 11, pp. 91-103.

[30]P. 100.

But what, then, is the remedy? Are we to flee from learning as from a plague? No, we are to pull it down "out of the seate of soveraigntie, and make it attend as an humble housemaid" upon spiritual wisdom. Downame specifically called the roll of the natural sciences, pointing out that of themselves they gave no contentment unless assimilated to a religious end:

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> And therefore these Arts and Sciences are not simply to be contemned, yea rather they are to be much valued and esteemed, as being Gods good gifts... but only as they are abused by carnall worldlings excelling in them.[31]

In the same vein was Robert Cleaver's *Godlie Forme of Household Government* (1598) arguing that children of all classes should be liberally educated because "unto what occupation or science soever any young man shall be put to the more skill and knowledge he hath in the liberal sciences, so much the more sooner shall hee learne his occupation."[32] Dudley Fenner published his *Artes of Logike and Rethorike* (1584) to make logic simpler for the many. The movement of Puritan education was in a democratic direction, but some groups were trying to force it into more strictly religious patterns. Thus the Brownists and others as represented in Henry Ainsworth's *An Apologie of Brownists* (1604) officially addressed a petition to King James proposing a revision of the curriculum at the universities which would have narrowed it to subjects immediately bearing on the study of Scripture and have eliminated most of what little science was being taught there.[33] John Stockwood and his like would have preferred to see in the grammar schools less emphasis on the classics and more on "such things as may further the soules of

[31]Pp. 101-02.

[32]P. 332.

[33]P. 78, The Thirteenth Position of the Third Petition: "Because the Scriptures are fully sufficient for all instruction and conviction, both for faith and conversation etc, and therefore all other studies learning and courses had in Schooles and Universities, to be no further nor otherwise allowed, then may be warranted by the word of God, and be serviceable thereunto: whether for the better understanding thereof, or for convincing the adversaries, or for other good use in Church and Common wealth."

our schollers unto godlines and vertue."[34] Yet it does not appear that the old classical curriculum was in fact much affected during Elizabethan times; and in the new Puritan colleges like Sidney Sussex, established during the reign, no more and no less science was taught than in the colleges otherwise controlled.[35] At any rate, many Puritan divines, like William Fulke and William Perkins, were undoubtedly well up on science, and the volume of scientific work and publication by Puritans, already appreciable under Elizabeth, was to wax as the seventeenth century went on.

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But as against its Downames, Greenhams, and Cleavers, Puritanism had also its Samuel Wrights, Henry Smiths, and Robert Rollocks who were more struck by the perils than by the benefits of earthly knowledge. Their recourse was to the same tradition from St. Paul and Ecclesiastes which we have seen fermenting within both Anglicanism and Catholicism. In one sermon Samuel Wright reached the conclusion that

> mans wisdome and knowledge, even in the Scriptures, without humility and sanctification, is a let and hinderance to the learning of Christ by them; even as strong holds, and well furnished with munition, are harder to take then weaker: so are wise men, learned men unsanctified, harder to be wonne, then rudè and ignorant people. Their wisedome, their learning etc. is as munition, whereby Satan helpes (as Proverbs 12.) to hold them against the Lord.[36]

Henry Smith did not exactly agree that the sciences were Satan's artillery, but he warned all "deepe Clarkes, and great Doctours" that "Knowledge . . . draweth a greater judgement, and oftentimes condemnes the bearer" because it left no excuse for ill-doing.[37] Robert Rollock, the Scottish Presbyterian, was so angered by the pride of scholars that he said he thought idiots had a better chance of learning the true spirit of the Gospel.[38] What such clergymen

[34]John Stockwood, *A Sermon Preached at Paules Crosse* (1579), fol. 67v. The movement was not confined to Puritans. Thomas Becon, p. 350, advocated a like course; and cf. George Gascoigne, *The Glasse of Government* (1575).

[35]Knappen, pp. 469, 471.

[36]*Divers Godly and Learned Sermons* (1612), p. 194.

[37]*The Triall of Vanities* in *Sermons* (1593), p. 835. Also pp. 512, 978, 982-83.

[38]*Sermons* (1616), p. 112; also pp. 108, 132-33.

preached often amounted to the same thing as the notorious doctrine which they themselves liked to foist on Catholics, that ignorance is the mother of devotion. Learning was a liability to the soul in its pilgrimage. Then farewell letters, farewell the study of the classics and of natural science. For the simpletons of this life are the sages of the next.

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Something of this turning inward away from the outward values and accomplishments of the world is of the essence of every religion. As a highly dedicated movement of spiritual reform Puritanism probably had more of this otherworldly temper than did the Anglicanism from which it was trying to emancipate itself. The question therefore presents itself on this and many other grounds whether Puritanism was a more or a less fertile soil for natural science than were its rival religions in England. For the seventeenth century as a whole, several scholars have brought statistics to show that Puritans crowded into the natural sciences in numbers out of proportion to the size of the Puritan population.[39] Argument has been advanced on the contrary that many of those thus considered Puritans were not so at the time and that their entry into science was due not to religious but to other causes.[40]

For my own period before 1610 I have tried in vain to find convincing evidence either for or against Puritanism on this score. At every turn one is confronted by the difficulty of determining which scientists were Puritans and which not. In many cases biographical information about their religious beliefs is either completely lacking or else so sketchy as to make classification impossible. Nor are their publications usually of much help. The scientific treatises of the age are often rich in piety, but it is of the undifferentiated kind which reveals only that their authors

[39]E.g. Robert K. Merton, "Science, Technology and Society in Seventeenth Century England," *Osiris*, V (1938), 360-591; and "Puritanism, Pietism, and Science," *The Sociological Review*, XXVIII (1926), 1-30. Dorothy Stimson, "Amateurs of Science in 17th Century England," *Isis*, XXXI (1939), 32-47. George Rosen, "Left Wing Puritan Science," *Instit. Hist. Med.* XV, (1944), 375-80.

[40]Knappen, pp. 478-79.

were Christians, not whether they were Puritans, Anglicans, or Catholics. To be sure, some exceptions occur. The physicians Lorkin, Phayre, and Caius can be distinguished as Catholics, the two Turners, William and Peter, as active Puritans. But where the majority of sixteenth-century English scientists stood on the gradually emerging issues of Puritanism, what they thought of prelacy, the liberty of prophesying, Sabbatarianism and so forth is not recorded. It seems impossible to say, for instance, what were the convictions of William Gilbert or Robert Norman or Thomas Hood or a host of others on such questions. John Dee kept a long diary without alluding to them. John Hester was a good Christian, but that is about all we know. The surgeons George Baker, William Clowes, and John Banister went their ways to dusty death carrying their particular brands of religious belief locked in their own hearts. The list stretches on almost indefinitely.

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Quite probably a good many of these scientists did not know or did not care or had not made up their minds about the controversies of Puritanism which at the close of the sixteenth century seemed as yet largely theological, only beginning to acquire later political and social complications. One might add, too, that in order to tag this precise number of workers in science as Puritan and that precise number as Anglican we should have to make the questionable assumption that exact religious labels can be affixed to the infinite mutations and vagaries of human piety. In sum, it seems wisest to conclude that on the evidence available no adequate statistical solution of the problem in the Elizabethan age is possible.

On the purely doctrinal side we have remarked that Puritanism shared with Anglicanism and Catholicism many of its basic attitudes towards science. All three creeds were theoretically friendly to human knowledge, including science, provided that it observed a proper subordination to faith. All three embraced wide variations of emphasis and interpretation by individual divines within this central attitude. Calvin's enthusiasm for the study of nature affected both Anglicans and Puritans, and was probably no

keener than that of many Catholics, including Aquinas. All three, but perhaps Puritanism in special degree, had their mystics, intuitionists, and moral zealots, often but not always averse to science. To read the diaries of Richard Rogers and Samuel Ward,[41] for example, is to realize that many Puritans were too fervently absorbed in the internal struggle with Satan to be much interested in the outer studies of the world. And, later, John Bunyan was no member of the Royal Society.

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On the other hand, Puritanism had some special features which helped to foster the growth of the new science. It had a driving spirit of iconoclasm which could be transferred from the religious field to the destruction of the old scientific orthodoxies. Also, the strong influence of laymen in its form of church government made it more easily penetrable by new ideas. Puritanism, moreover, was the religion of the middle class merchants who supported Gresham College and in many directions displayed their interest in applied sciences like navigation, metallurgy, and land surveying. One might ask, of course, whether they were interested in these sciences because they were Puritans or because they were merchants. But the form of the question is misleading. They were interested because they were Puritan merchants, Puritanism having allied itself with mercantile utilitarianism in a potent combination of religious, economic, and social forces. Here, perhaps, rather than in the field of explicit dogma, its help to science was strongest. On the total balance, then, we can see from our vantage point in the twentieth century that Puritan worldliness was ultimately to aid science more than Puritan otherworldliness was to inhibit it, in proportion more perhaps (though this is much less certain) than could Anglican doctrine or practice. But the effects of such impetus were to become visible only gradually as Puritanism developed. The Elizabethan age came too early to afford concrete evidence for distinguishing and weighing against each other clearly the contributions of Puritans and Anglicans to science.

[41]See M. M. Knappen, *Two Elizabethan Puritan Diaries* (Chicago, 1933).

V

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This analysis of the status of mundane in relation to religious knowledge would not be complete without some notice of the stand taken by Elizabethan literary men and lay leaders of thought. In this as in so many other matters Sir Philip Sidney may be chosen as the norm. The *Defence of Poesie* (pub. 1595) contained his secular adaptation of the theological view that all knowledge, and science in particular, must serve God. His way was to say that it must serve right conduct:

> This purifying of wit, this enriching of memorie, enabling of judgement, and enlarging of conceit, which commonly we cal learning ... the finall end is, to lead and draw us to as high a perfection, as our degenerate soules made worse by their clay-lodgings, can be capable of.

Some, Sidney declared, have studied astronomy, natural philosophy, mathematics.

> But when by the ballance of experience it was found, that the ASTRONOMER looking to the stars might fall in a ditch, that the inquiring PHILOSOPHER might be blind in him self, & the MATHEMATICIAN, might draw forth a straight line with a crooked hart. Then lo did proofe, the overruler of opinions make manifest, that all these are but serving sciences ... directed to the highest end of the mistresse knowledge ... which stands as I thinke, in the Ethike and Politique consideration, with the end of well doing, and not of well knowing onely.[42]

Sidney's placing of the end of knowledge in ethics did not imply a distaste for its service in the cause of religion, the two being for Elizabethans so closely coupled. His piety led him to begin a translation of Mornay's *Of the Trewnesse of Christian Religion*, completed after his death by Arthur Golding. And, according to Thomas Moffet's biographical account in *Nobilis*, with intense scientific interest Sidney "pressed into the innermost penetralia of causes; and by that token, led by God, with Dee as teacher, and Dyer as companion, he learned chemistry, that starry science, rival to nature."[43] For Sidney there was no contra-

[42]Ed. Albert Feuillerat (Cambridge, 1926), p. 11.

[43]Ed. Virgil Heltzel and Hoyt Hudson (San Marino, 1940), p. 75. Also Hardin Craig, *The Enchanted Glass* (Oxford, 1936), p. 93.

diction between the two activities, nor did he worry that chemistry might endanger his soul.

Knowledge for knowledge's sake was as little conceivable to the Elizabethans as was art for art's sake. Like Sidney, Edmund Spenser displayed his strong ethical bias when in his Castle of Alma (*The Faerie Queene*, Book II, Canto IX) he used the sciences of anatomy and psychology for religious and moral edification. So did Phineas Fletcher in *The Purple Island* (1633), and a host of others in the *nosce teipsum* school of Sir John Davies, not to mention the moralistic encyclopedists like Du Bartas, La Primaudaye, and Palingenius. These writers summoned all the resources of science and philosophy to help explicate the physical and spiritual natures of man and his dual relationship to the world and to God. Here was unquestionably the main stream of Elizabethan secular thought as to the proper role of the sciences. They were to make man understand himself and his world, and in so doing to help him see the religious and ethical meaning of his life. They were to be integrated with what he knew from other sources, not to stand apart as a separate, independent, dissenting discipline. Neither were they to be a ladder for personal ambition, nor the fruitless treasure house of an egoist like Gabriel Harvey, whose pathetic marginalia witness that he knew everything and accomplished nothing. Nor, above all, were they to be set in opposition to religion as by a man like Christopher Marlowe. His chief characters thought "there is no sin but ignorance" and eulogized man's soul "still climbing after knowledge infinite"; but he saw well that knowledge need not serve Christianity, and, despite a momentary aberration in *Doctor Faustus* (1589), fundamentally scorning Christianity, he chose knowledge.

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In the degree and direction of his deviation, however, Marlowe had few companions in his time. Among his colleagues in literature who had qualms about an opposition between mundane learning and Christianity the usual reaction was to choose the latter and cast out the former altogether. There was much of this in the repentance literature of George Gascoigne, Robert Greene, Thomas Lodge, John Lyly and others, some of it no doubt sincere, some

of it merely a pose or a concession to public prejudice. So, after a profligate life, Greene in his *Vision* (1592) swung back from extreme worldliness to an equally extreme otherworldliness. All learning save that of religion is futile:

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> Canst thou number and extract, as the cunning Arethmetician: or with Geometrie measure the ground, and levell out the plaines by the excellencie of thine arte. Canst thou reach unto the heavens with thy knowledge, and tell the course of the Starres . . . ? Canst thou tell the secrets of Philosophie, and like a cunning naturalist, discover the hidden aphorismes of arte, and set out the nature and operation of all things? . . . thou shalt finde the studie of them to bee utter vexation of minde, and vanitie . . . so abjure all other studies, seeing *Omnia sub coelo vanitas*, and onely give thy selfe to Theologie: be a Devine my Sonne, for her documents are severitie, and her foode is the bread of life. . . .[44]

Perhaps this was only a last fling of deathbed exhibitionism by a man who had been pamphleteer and publicist all his life, but more probably it represented one typical refuge of the Elizabethan temperament. The idea of the next world lay never far below the surface of consciousness in the Elizabethan mind. Average men might and did oscillate between the two worlds all their lives long. And when a sense of heaped-up guilt overwhelmed the conscience it often caused a desperate flight from all earthly values to those of heaven. Greene, who as a Cambridge M.A. should have known better, was commonly reactionary in his views of science. His play *Friar Bacon and Friar Bungay* (pub. 1594) was distinctly reminiscent of medieval superstition in its identification of science with black magic, and another of his dramas, *A Looking Glasse for London and England* (pub. 1594), decried the idea of natural law in favor of the miraculous.

Gascoigne's was a similar but more moderate case. In his last years, after a vigorous and worldly life, he adopted just as vigorously the mood *de contemptu mundi*, translated a number of works from the Fathers on the imminence of doom and the worth-

[44] *Works*, ed. Alexander Grosart (1881-86), XII, 278-79. See Willard Farnham, *The Medieval Heritage of Elizabethan Tragedy* (Berkeley, 1936), chap. 2 on Christian otherworldliness.

lessness of human knowledge,[45] and wrote *The Glasse of Government* (1575), a highly didactic drama on education. The burden of the latter was the theme we have already encountered among some of the Puritans, that since the chief aim of education was to instill godliness, the teacher must depend largely on the Bible and the more virtuous classics, avoiding those classical philosophers—Anaxagoras and Protagoras are mentioned—from whose natural studies "hath sprong the damnable opinion of Atheysts." For the mind of man if it be

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tempred by a modest moderation, to have regard unto vertue, and moralitie, then proveth it both goodly & godly: wheras if it run on hedlong, only led by natural considerations of causes, it may prove admirable for some passing quallitie, but it seldome is seene commendable or allowed for perfection. The consideration wherof hath often moved me rather to enstruct youth by a prescribed order out of gods own word, then to nuzzle over deepely in philosophical opinions.[46]

Here the retreat from science in its classical connections was well under way, with emphasis on its perils and inutility for godliness.

Since John Lyly was nothing if not canny about what his public wanted, his introduction of the same topic into "Euphues and his Ephoebus" (1579) speaks worlds for its popularity. Euphues spent ten years at the university "searching out the secrets of Nature & the hidden misteries of Philosophy," only to give it all up in favor of the study of divinity:

Is *Aristotle* more deare to thee with his bookes, then Christ with his bloude? What comfort canst thou finde in Philosophy for thy guiltie conscience, what hope of resurrection, what gladde tidings of the Gospell.... Farewell Rhetoricke, farewell Philosophie, farewell al learninge which is not spronge from the bowels of the holy Bible.[47]

[45] *The Droome of Doomes Day* (1576), in *Works of George Gascoigne*, ed. J. W. Cunliffe (Cambridge, 1910), II, 223, 335, 388. See. C. T. Prouty, *George Gascoigne* (New York, 1942), chap. 4, pp. 85 ff.

[46] Act IV in *Works*, II, 69.

[47] In *Works of John Lyly*, ed. R. W. Bond (Oxford, 1902), I, 287, 289. In Act I, Sc. 3 of *Campaspe* (1584) the systems of Aristotle and Cleanthes are treated as naturalistic and hence atheistic, in contrast to the supernaturalism of Plato. But in "Euphues and Atheos" Lyly does not strongly connect science with atheism.

One remembers also Thomas Nashe's similar frantic revulsion in *Christ's Teares over Jerusalem* (1593), though this seems to have been, like Greene's, a genuine personal experience, perhaps motivated by the successive unhappy deaths of his two friends, Greene and Marlowe, in 1592 and 1593. Thomas Lodge, on the other hand, was obviously being merely clever when he brought the same types of argument into his *Paradoxes* (1602) under the heading "That ignorance is better than knowledge."[48]

Whatever the sincerity of the numerous literary men who handled it, the idea that a scholar must burn his books in order to repent evidently had more than a merely superficial currency among the people to whom this literature was addressed. No doubt it sprang in part from the common dread and awe of learning often associated in the popular mind with the black art. Significantly, the attitude flourished best in such genres as the drama and the prose pamphlet aimed at a large, unselected, and relatively unschooled audience. It was as garish and unconditional as a newspaper headline, and had the same kind of appeal. But this attitude of all or nothing—all religion with no science or all science with no religion—was not, we must recall, the view prevailing among theologians, scientists, or lay intellectuals who were neither. The Greenes and Lylys were merely dramatizing and exaggerating the position of the more extreme theologians like Rollock, Ochino, and Wright, who were most conscious of the hazards of learning to piety. And they were overlooking completely the fine modulations with which the greater number of the clergy were trying to define the proper relationships between the two.

VI

Nevertheless it is clear from the evidence presented that while most thoughtful Christians accepted science so long as it behaved itself they continued to feel gnawing fears about its possible consequences. The presumptuous student of nature might always lift his head above the stars and find no God. Or even if he did not

[48]Pp. 23-24, 27, 32.

question religion directly, his pride might lead him by a thousand doors to damnation. Consequently scientists as a group made every effort to show that natural philosophy served religion humbly and well. The dedications, prefaces, and sometimes the texts, of hundreds of Elizabethan scientific publications carried explicit reassurance on this cardinal point. They accepted fully the premise that man's business here on earth was to save his soul. Deeds subserving this end were good; the rest, evil or nugatory. Science must prove its right to stand among the good. Accordingly the scientist seized on those parts of the religious justification of learning which were friendly to his claims, and paid no attention to the remainder.

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For one thing, he took full advantage of the broad principle that study of the world of nature was a means of coming to know God. On no narrower foundation could he build his case. It became the standard opening for dozens of books in every division of English science and the one sure recourse whenever science came under religious censure. William Caxton's popular little *Myrrour of the Worlde* (1529) may speak for the rest:

> Than they thought . . . that they sholde never have knowledge of our lorde god ne of so hye myght but yf they entended and serched in his workes which they founde so excellent. . . . For by the work is the workeman knowen. . . . And whan the more that they knew of hys workis and of his wisedome so much more had they the better will to love their creatour and maker & to honour hym consyderynge that he hadde made so noble a thynge and so worthy as is the heven in which ben the starres. . . . For it was all theyr affeccyon intencyon and reason to knowe god for as much as they knew certaynly that god had gyven to them with nature wyt and reason for to serche and comprise of thynges of therthe and of them of heven as moche as they myght know. . . .[49]

The same attitudes, including the belief that God not merely passively permits science but actively requires it through his giving man the intellectual means by which it is pursued, kept appearing all through the sixteenth century in the works of many

[49] Sig. C iv.

scientists: Recorde, Dee, and Digges in mathematics and astronomy, Banister and Bullein in medicine, Huarte in psychology, to name but a few.[50] In particular the scientist could also plead that without mathematics, astronomy, botany, and the like, the true interpretation of the Bible would be badly hampered. This was part of Thomas Hood's case for astronomy in *A Copie of the Speache* (1588):

> Divinitie containeth matter of salvation, and nothing is superfluous in the woord of God, yet can it not be expounded without these artes, else let them describe the feaste of Easter, or justefie the historye of the three wise men.[51]

Cosmography also had a contribution to make, as William Cunningham emphasized in his *Cosmographicall Glasse* (1559), for without it what expositor, however pious, could tell the proper location of the cities, regions, and rivers named in every book of Scripture, not to mention that of the earthly paradise?[52] And so forth. On such problems, we have seen, the clergy welcomed the aid of secular learning.

As might be expected, any mention of the vanity of all mundane searching, the feebleness of man, and the mortal dangers of the pride that puffeth up was usually absent from the treatises of science. Instead, the Elizabethan natural philosopher spoke much and enthusiastically about man, the excellent microcosm, the noblest work of God, whose body is a masterpiece of architecture and whose mind surveys the grandeur of the world,

> in whose braine, as in *primo mobili*, is fixed that inesteemable Jewel called *Reason*, no monster or Idole, but the mother of all Artes & Sciences, by whome (God guiding the same) are wrought & invented marveilous matters by Sea and by land, in every matter of speculation and practise.

[50]E.g. Thomas Digges, *Alae seu Scalae Mathematicae* (1573), Praefatio, sig. A1r; John Dee, Preface to Henry Billingsley's translation of Euclid's *Geometrie* (1570), sig. a3r; John Banister, *The Historie of Man* (1578), fol. 31r, etc.

[51]Sigs. B3r & v and B2r; Dee, loc. cit.; Ramus, *The Way to Geometry*, tr. William Bedwell (1636), Preface, sig. A5v.

[52]Preface, sig. A4v; Anthony Askham, *A Lytel Treatyse of Astronomy* (1552), Epistle Dedicatory.

So wrote Nicholas Gyer in *The English Phlebotomy* (1592), and in the same vein wrote most other scientists who had anything to say about man.[53] Moreover they dwelt upon the duty of the Christian not to hide his talent but to gather knowledge and share it with his fellows. "As therefore," declares the anonymous *A Treatise of the Nature of Salt* (1612),

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> it were condemnable curiositie, to search and pry into the mysteries of faith, and to seeke to make them subject to humane apprehension: So is it inexcusable slothfulnesse, not to search narrowly into such secrets of Nature, and such excellency of the creatures as God hath vouchsafed to reveale in his word.[54]

The moral obligation to spread science for the benefit of humanity was emphasized by scientists in a large proportion of their prefaces and seems to have formed one of their chief bulwarks.[55] Along these lines developed their answer to the accusation that learning bred pride and ruined morals.

In the famous opening of his *Advancement of Learning* (1605), after first rehearsing the common religious objections to science, Francis Bacon gathered all the foregoing arguments into one brilliant brief for the defense.[56] On two points he chiefly lingered. No amount of scientific knowledge, he said, can of itself make arrogant the mind of man, infinite as it is and endowed by God with the joyful power and duty to image the universal world. Pride comes from other sources within the soul and must be corrected, in the activities of science as in all others, by Charity, which means a referring of scientific labors to the useful good of mankind. As for the charge that science breeds atheism by dwelling upon natural law, Bacon admitted that a little science might have that effect but contended that "a farther proceeding

[53]Sig. A3v; Thomas Tymme, *A Dialogue Philosophicall* (1612), p. 37; Banister, loc. cit.

[54]P. 8.

[55]See an excellent statement in William Turner, *Boke of the Natures and Properties of All Wines* (1568), Epistle Dedicatory.

[56]*Works of Francis Bacon*, ed. James Spedding et al. (1857), III, 264-68. See Geoffrey Bullough, "Bacon and the Defence of Learning," in *Seventeenth Century Studies Presented to Sir Herbert Grierson* (Oxford, 1938), pp. 1-7.

therein doth bring the mind back again to religion." Religion, he said, must learn to live with the fact that God operates the world by natural laws, nor do we preserve God's power, rather we derogate from it and offer Him the unclean sacrifice of a lie if we deny this truth. And Bacon's final prescription was that divinity and philosophy be kept separate and not be unwisely confounded.

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This was only a part of Bacon's message, to which he himself later found it necessary to add many qualifications, but it represented the essence of the Elizabethan apologia for science. In the chapters to come we shall have opportunity to test its soundness from many sides and shall conclude that it was not altogether sufficient. For scientific materialism was pressing upon the Elizabethan doctrine of spirit at many points and at some of them was beginning to break through in a way not quite realized, I think, by the scientists themselves. We may reserve this discussion for Chapter 5 and those chapters which follow it, devoting Chapters 2, 3, and 4 meantime to other aspects of the general Elizabethan theory of knowledge bearing upon religion and science.

2

Theory of Knowledge

Understanding is a power of the soul, by which we perceive, know, remember. and judge, as well singulars as universals, having certain innate notices or beginnings of arts, a reflecting action, by which it judgeth of his own doing, and examines them.

ROBERT BURTON, The Anatomy of Melancholy

I

NATURAL SCIENCE is a gift of God to man. We have just seen how important a link between Elizabethan scientists and divines was this idea, acceptable to a majority in both groups. But of course it did not mean that science, or knowledge in general, is a package somehow deposited by God ready-wrapped in man's mind. It meant rather that when God creates human souls he gives them the power to apprehend accurately through the senses the events of the outer world and then to reach general truths about them through reason. In short, it involved a general theory of knowledge.

The foundation of this Renaissance theory of knowledge as set forth by psychologists and philosophers like Bright, Laurentius, La Primaudaye, Burton, and the rest was therefore religious. Details of the theory, however, they inherited helter-skelter from the rival epistemologies of Aristotle, Plato, and the Stoics, modified and reinterpreted by the no less keenly rival realists, nominalists, and conceptualists of the Middle Ages.[1] Ramism also had its

[1]For the backgrounds see Aristotle, *De Anima*, Pt. II, in *Works*, ed. W. D. Ross (1931), III, 424 ff.; Alfred E. Taylor, *Platonism* (Boston, 1924), chap. 2; Aquinas, *Summa Theologica*, Dominican tr. (1921), Pt. I, Qq. 84-86; Meyrick H. Carré, *Realists and Nominalists* (Oxford, 1946), pp. 70, 75 ff.; George S. Brett, *A History of Psychology* (1921), II, 73 ff., 84-85, 115-16. For Ramism see Herschel Baker, *The Wars of Truth*, (Cambridge, Mass., 1952), pp. 98-104.

influence. The result was confusion. Were general ideas (universals) somehow inherent in each human mind, or were they abstracted by it from particular sense impressions? And were such ideas real in some way or merely verbal? Elizabethan writers gave few clear answers, but probably a majority, like Burton, La Primaudaye, and Melanchthon, adopted a moderate realism, declaring that God when creating the soul plants in it "a knowledge of numbers and of order, the Principles and beginning of Artes."[2] Examples are the ideas that two and two make four, that contraries cannot both be true, and the like. By applying these innate criteria to incoming sense data through processes of logic, analysis, synthesis, induction, deduction, the human reason is able to construct the systems of the sciences.

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Sense data were thus acknowledged to be indispensable elements in cognition. Almost without exception, also, Elizabethan psychologists believed that in the average healthy human being such data were true and reliable reports of what was happening in the world outside the body. Physical or mental disease might of course bring on hallucinations. Or the idols of tribe, den, and theater might distort a man's interpretation of what his senses told him about the physical world. But in the main, human beings were composed for truth, not for error. God did not put us here on earth under a life sentence of illusion. Despite some skeptical exceptions to be noted among certain literary men at the end of the next chapter, this certainly was the view of almost all Elizabethan philosophers, psychologists, and doctors. Finally, they

[2]La Primaudaye, *French Academie*, Pt. II (1605), pp. 153 ff. Cf. Sir John Davies, *Nosce Teipsum* (1622), p. 116, and Richard Hooker, *Laws of Ecclesiastical Polity*, ed. Keble (1888) I, 217, 228, describing the soul as a *tabula rasa*. Melanchthon, *De Anima* (Vitebergae, 1542), fols. 129v ff., gives one of the best of all Renaissance discussions. Timothy Bright, *A Treatise of Melancholie* (1586), p. 76, explicitly rejects the Platonic theory that the soul is born with specific ideas, apart from a general understanding of first principles. So does Calvin, *Institutes* (1587), fol. 81r. Majority Elizabethan opinion did not favor an extreme Platonic realism. Andreas Laurentius, *A Discourse of the Preservation of the Sight* (1599), p. 76, stresses nominalistically the power of reason to make universals out of sense data. The final Elizabethan position seems to resemble the moderate realism of Aquinas as set forth by Carré, loc. cit. Not one of these men was a skeptic.

agreed also that sense data, however accurate, were only raw materials to be assimilated to the innate higher principles of the mind. From the working of these principles came Understanding, the lofty power distinguishing rational man from the irrational brute unable to rise above sense. It made man man.

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Elizabethans saw here an important analogy between the function of reason in acquiring natural science and its function in discovering the precepts of ethics. Just as reason held inherent criteria for separating truth from falsehood in the physical world, so also it had the power from God to distinguish good from evil in the moral world. That is, reason had insight into the ethical law—the "law of nature" applicable to man. Both knowledges were inscribed in man's soul by the Almighty, and both were powers of the same reasoning faculty. Bishop John Hooper, like many others, believed the truths of the moral law were as self-evident as those of mathematics.[3] And not only psychologists but a number of theologians, including John Downame in *Guyde to Godlynesse* (1622)[4] and John Calvin in *Institutes*[5] accepted the idea that conscience arrived at its decisions by means of an Aristotelian syllogism. What matters to us here is that Elizabethans considered man's perceptions of natural science just as native to his mind, just as deeply, permanently, and validly founded in his faculty of reason, as the perceptions of good and evil which must guide his spiritual life.

The orthodox realism of Elizabethan epistemology, resting on this religious base, had manifold importance for science. It did not deny the need for observation and experiment but laid chief stress on innate powers of mathematics and logic. The swing that

[3]*Early Writings of John Hooper*, ed. Samuel Carr (1843), Parker Society, XX, 152. Besides Richard Hooker's great exposition of the law of Nature, see a full treatment in Bullinger, *Decades*, ed. Thomas Harding (1849-52), Parker Society, VII, Decade 2, Sermon 1, pp. 193 ff. Also John Dod, *A Plaine Exposition of the Ten Commandements* (1606), p. 4; William Perkins, *A Discourse of Conscience* in *Works* (1605), pp. 619-20.

[4]P. 66. Aquinas, Pt. I, Q. 79, Arts. 12 and 13, goes fully into the problem. Burton, p. 189.

[5]Fol. 84r.

Elizabethan science was beginning to make away from scholastic reliance upon unsupported reason towards a fresh exploitation of facts required, perhaps, no entirely new epistemological theory but certainly a heavy shift of emphasis within the old. On the other hand, existing theory gave the freest possible play to that use of mathematics which was proving so fruitful in Galileo's physics and Copernican astronomy. Oddly enough, most contemporary English scientists did not discuss the theory except to say emphatically, as did especially the Paracelsans[6] and Copernicans,[7] that experience as well as reason was essential to the growth of knowledge. But it is interesting that Francis Bacon showed leanings towards nominalism,[8] while at the same time taking a strong stand against skepticism.

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II

This, then, was the dogmatic and unskeptical tenor of the Elizabethan theory of knowledge, voiced explicitly by most psychologists and divines, assumed tacitly by most natural scientists. It rested on the faith that God, having placed man here on earth, could not have been so wasteful or so ironic as to blind him to the real nature of the surrounding world. On religious grounds a challenge to this belief could come from only one direction—from the doctrine of original sin. What if the Fall had so corrupted man's faculties as to destroy his birthright of knowing his world? Then all science was false, and would continue to be so, except as God rescued it by giving to chosen individuals at chosen times a special grace to discover the truth. Under such a view science would be inextricably confused with theology. Possession of God's supervening grace would become the criterion of scientific truth. And who could tell where grace was and where not? Evidently the net consequence of such a doctrine might well be

[6]See Paul H. Kocher, "Paracelsan Medicine in England," *Journal of the History of Medicine,* II (1948), 451-80.

[7]See Francis R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore, 1937), pp. 173-75.

[8]E.g. *Novum Organum* in *Works,* ed. Spedding et al (1858), IV, Aphs. 51, 63. Cf. Basil Willey, *Seventeenth Century Background* (1949), pp. 27-28.

a general skepticism about the entire achievement of science.

In fact, however, no such skepticism resulted, and for the excellent reason that even Luther, Calvin, and their adherents who gave most scope and severity to the doctrine of original sin never applied it fully to natural science or to man's other mundane activities. They recoiled from the consequences. Instead, theologians of all faiths drew a firm line between activities of salvation and activities of secular life or "civil honestie," including science. According to both Lutherans and Calvinists original sin totally depraved man's will and his intellectual knowledge of God, but it only partially darkened the profound understanding of natural science that Adam had in Eden. Enough sparks of the latter were left to permit his descendants to discover scientific laws without further bestowal of any special grace. Consequently, for the rectifying of man's evil will and ignorance of things divine pertinent to salvation, a new grace must be conferred, but for science not. As a result, science went free of theology in this respect with the approval of the theologians themselves. Nor did they become skeptical about the powers of science in its own field.

So fundamental were these decisions to the freedom of Elizabethan science under the favor of the clergy that the evidence is worth presenting in some detail. Of the Catholic position, which had only diminishing influence in England after the death of Queen Mary, it is sufficient to say that it remained always more moderate than the Protestant in estimating the damage to man's faculties from original sin and hence had less difficulty in crediting him with capacity for science. As expounded in the official Catholic homilies (an interesting forerunner of Queen Elizabeth's later homilies) by Bishop Edmund Bonner in 1555:

> . . . the whole nature of man, both in bodye and soule, was thorough orygynall synne, greatelye defiled. For the soule (which is the chief part of man) loste thereby the especiall gyftes of grace, with whiche it was indued in the creation, and besydes that it was also maymed in the gyftes of nature, as in memorye, intelligence, wyll, and other lyke.[9]

[9] *A Profitable Doctryne, with Certayne Homilies* (1555), fol. 13r.

Noticeable here is the differentiation between man's gift of supernatural knowledge, which was quite lost in the Fall, and his gift of nature, including the practical intelligence, which was only maimed. Aquinas clearly says that man can know physical nature by his own natural light, that he needs a new light from God only in order to know heavenly things.[10]

Rebelling from the Catholic doctrine that man is able to help in the work of grace, Luther often insists in the most unqualified language that man is totally helpless because totally depraved.[11] Taken by themselves these sweeping pronouncements would seem to include science in the general wreck of human dignity. But Luther is not thinking of science when he makes them; he is thinking of morals and faith.[12] When he refers specifically to science, as he does in his commentaries on Genesis and on the Fifteen Psalms, he is condescending but not hostile, and he does not make it depend on grace. The preceding chapter has discussed this point.

Calvin takes the same view even more clearly in his *Institutes*. He adopts the formula of St. Augustine that "the naturall giftes were corrupted in man by sinne, and of the supernaturall he was made emptie."[13] He then develops the distinction between emptiness, which is complete abolition, and corruption, which is mere wounding. Among the abolished he sets "as well the light of faith as of righteousness"; among the maimed, "policie, governance of household, all handy craftes, and liberall Sciences," the latter including natural science.

[10]Aquinas, Pt. II (1st Pt.), Q. 109, Art. 1, Dominican tr., VIII, 325: "And thus the human understanding has a form, viz., intelligible light, which of itself is sufficient for knowing certain intelligible things, viz., those we can come to know through the senses. Higher intelligible things the human intellect cannot know, unless it be perfected by a stronger light, viz., the light of faith or prophecy which is called the *light of grace*, inasmuch as it is added to nature." See also Richard Cavendish, *The Image of Nature and Grace* (ca. 1570), explaining the difference between the Catholic and Protestant doctrines of original sin.

[11]See esp. *A Commentarie upon Galatians* (1581), passim.

[12]Ibid., esp. fol. 127v.

[13]Fol. 80r & v.

Nowe do follow the artes, both the liberall, and the handie crafts, in learning whereof, because there is in us all a certaine aptnesse, in them also doeth appeare the force of mans witte: but albeit, all men be not apt to learne them all, yet is this a token certaine enough of the common naturall power, that there is almost no man founde, whose conceite of witte doeth not in some arte or other shewe foorth it selfe . . . yet because without difference it happeneth to the godly and ungodly, it is rightfully reckoned among natural giftes.[14]

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He adds that to condemn the human mind to "perpetual blindnesse, that a man leave unto it no manner of skill in any kinde of things, is not onely against the worde of God, but also against the experience of common reason." On this doctrinal base reposed the surprising friendliness, indeed admiration, that Calvin shows for science throughout the *Institutes* and in his other writings, all very well known in England.

Further help in the same direction came from the widely circulated English translation of Henry Bullinger's *Decades* (1577) and Theodore Beza's exposition of Job. Beza was Calvin's successor at Geneva, Bullinger was Zwingli's at Zurich. Both men followed almost verbatim Calvin's argument that original sin completely destroyed man's power in faith and morals but only grievously weakened his talent for science. Of the latter Beza said in *Job Expounded* (1589?), "This wisdome though it be very much defaced by mans fall: yet God hath preserved in our minds certeine seedes of knowledge and good arts, without which, of men we should become beasts."[15] Beginning with the crucial distinction between matters earthly and heavenly, among the former being "all liberal arts and handicrafts," Bullinger proceeded:

The judgment and understanding of man in earthly things is not altogether none at all: but yet it is weak and very small, God wot. The understanding therefore that is in man doth come of God: but

[14]Fol. 81r.

[15]Sig. B5v. Also Beza, *A Briefe and Pithie Summe of Christian Faith* (1589), p. 11: "Notwithstanding, wee deny not but ye men have sufficient light to make them without excuse. And we spoile them not, nor deprive them of their naturall faculties & powers, which wee affirme not to have beene cleane taken away, but corrupted, as of reason, judgement, will, and such others to make them stocks or blocks. . . ."

in that it is small and weak, that cometh of man's own fault and corruption. But the bountiful Lord doth augment in men those gifts of his; whereby it cometh that man's wit bringeth wonderful things to pass. . . . But in the knowledge or understanding of heavenly matters there is not one small spark of light in man.[16]

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How closely Bullinger's *Decades* in particular came home to the Elizabethan clergy may be judged from Archbishop Whitgift's order in 1586 that every clergyman should procure a copy, read one of its sermons every week, and take notes of the principal topics.

What we are witnessing here is the growth of a tradition which was to leave open a strong place for science in Elizabethan theology, whether Anglican or Puritan. For it will bear repeating that the two main bodies of English Protestants were close together in their stand on original sin, however they might differ about the presbyterian form of government. Thus a practical exemption of science from the whole doctrine of redemption came to be more or less taken for granted on all sides. Archbishop Edwin Sandys in his *Sermons* (1585) adopted the distinction that "the will of man, being free unto natural and civil actions, hath of itself no freedom to desire things heavenly and spiritual."[17] The same distinction turned up in Alexander Nowell's famous *Catechism*.[18] John Downame, the Puritan, gave two chapters of his *Second Part of Christian Warfare* (1611) to discussing the arts and sciences without even mentioning original sin.[19] That accomplished Calvinist, William Perkins, discussed the effects of original sin on faith and morals without even mentioning science.[20] The separation was typical and, needless to add, was not unpleasing to the scientists. Of course everybody admitted that man knows only a fraction of the natural science he would have known if he had never fallen. But he does know something, and he knows it by

[16]*Decades*, Parker Society, IX, Decade 4, Sermon 2, p. 99.

[17]Ed. John Ayre (1841), Parker Society, XLI, 24.

[18]Ed. G. E. Corrie (1853), Parker Society, XXXII, 138.

[19]Chaps. 10 and 11, pp. 91-103.

[20]*Exposition of the Creede*, p. 181 ff., and *Exposition upon Jude*, pp. 9 ff. in *Works* (1605). Also Rogers, p. 104.

the natural light of reason and sense experience which, though dimmed in all of us, burns equally in the godly and the ungodly.

Thus, long before Francis Bacon came to preach the separation of science and religion, theology itself split apart the twin continents of natural and supernatural knowledge. Theology took to itself the latter, leaving the former to human science, with the single great commandment that natural knowledge must always subserve the revelation granted through Scripture and Church, never challenge it. The practical results for Elizabethan science therefore were a substantial degree of independence and respect from the clergy and the avoidance of a complete general skepticism about the study of the physical world.

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III

In consequence of these two principles, that God creates human beings with a real power to know scientific truth and that this power is not wholly defeated by original sin, Elizabethan Christianity affirmed the accuracy and validity of natural science in its own sphere. What was its sphere? Not, of course, the higher mysteries of godhead and redemption, such as the Trinity, the sacraments, sin and atonement, and the like. These were the dogmas of revelation, perceptible only by faith. Not even such subjects as the creation of the world and its eventual destruction by fire, dealt with in Genesis and the Gospels, for these great cosmic events were too closely involved with God's purposes to be susceptible of human investigation. Rather, the proper subject for science was the physical world as it moved between its beginning and its end, cause leading to cause.

By the opening decades of the seventeenth century science was well on the way to gaining general recognition as not merely valid but as supreme within this legitimate sphere. Test cases most pointedly arose when the findings of science seemed to conflict with certain passages in the Old Testament. If taken literally, these texts pictured, or seemed to picture, a flat earth as the center of the universe, lighted by the rotating sun and moon as the two

largest astronomical bodies, and overarched by a firmament above which God had mysteriously placed the waters described in Genesis. That the issue was brought to a head by Copernicus is well known. But less familiar is the equally important fact that from earliest patristic times Christian thinkers had been struggling with the problem of how to construe some of these texts. Under the surface, the real problem was whether knowledge of the physical world was to be reached through Scripture or through science. In every case, though sometimes very painfully, the decision even of the early Church was in favor of science.

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Knowing from Greek science, for example, that the planets were larger than the moon and that the moon had no light of its own, the Fathers interpreted the Genesis verse calling the moon a great light as referring not to its size and its emanation of light but merely to the fact that it looked large and bright.[21] Likewise, after a hesitation of some five centuries, the Church of the ninth century came around to believing that the texts which seemed to require a flat earth were couched only in popular language and did not prevent belief in the earth's roundness, as long ago posited by Greek and Ptolemaic astronomy.[22] Both these specific issues were settled well before the Renaissance. They constituted precedents toward acceptance, by all Christian denominations, of the great principle that God does not intend the Bible as a revelation of scientific truths but entrusts their discovery to human sense and reason. The Copernican controversy in the sixteenth century was merely another episode, though the most crucial of all, in the further crystallization of this principle. Its result was the old result that the scriptural texts, this time the geocentric ones, must

[21]Calvin, *Commentarie upon Genesis* (1578), p. 36, ran through all the earlier arguments and pointed out that "Moses doth not here curiously intreat of the secrets of nature, as a Philosopher," but "wrote commonly and plainely those thinges which all the simple, voide of learning and knowledge, understand by common sense." Likewise Andrew Willet, *Hexapla in Genesin* (1605), p. 10, thought Moses in mentioning the two great lights "speaketh according to the opinion and capacitie of the vulgar sort, to whose sight the Moone seemth greatest, next to the Sunne..." For use of the theory of accommodation by Renaissance interpreters of Genesis, see Arnold Williams, *The Common Expositor* (Chapel Hill, 1948), pp. 176-77.

[22]See footnote 1 of Chap. 9.

not be taken literally: they were merely language of accommodation suited by God to the sense of the common man, not meant as edicts about the nature of the physical world. Details of this struggle and its solution belong in Chapter 9.

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A parallel though less spectacular development took place at about the same time in the exegesis of the text describing the waters above the firmament. Ancient science seemed to speak less conclusively against these waters than against the earth's flatness, for example. They might be above Aristotle's solid spheres, and serve to cool their rotation. Hence Augustine, Bede, Isodorus Hispalensis and most other Fathers of the Church felt free to hold that these waters were not merely the moisture in the clouds but oceans supernaturally maintained by God beyond the spheres.[23] Aquinas made no advance.[24]

Luther pondered the text, would have liked to take the more naturalistic line, but ended by saying, "I here hold my own mind and judgment in captivity and bow to the Word, although I cannot comprehend it."[25] In contrast, Calvin's more scientific bias made him say outright, "It is against common sense and altogether incredible, that there are certeine waters above the heaven."[26] Therefore the waters above the firmament could only be clouds. Indeed, a change of tone was coming into the discussion. Those favoring the cloud theory were becoming more numerous and far more positive. Andrew Willet's *Hexapla in Genesin* (1605) is typical:

> By the firmament, which separated the waters which were under the firmament, from the waters above the firmament, divers of the auncient writers understand the starrie heaven, and that there are

[23]Augustine, *De Genesi Ad Litteram*, ed. J. P. Migne, Lib. II, caps. 1 and 5 in *Patrologiae Latina*, Vol. XXXIV; and *The City of God*, tr. John Healey (1909), Bk. XI, chap. 34; Isidorus Hispalensis, *Etymologiarum libri xx* in *Patrol. Lat.*, Vol. LXXXII, Lib. XIII, cap. iv; Bede, *Hexaemeron* in *Patrol. Lat.*, Vol. CXI, col. 18, and *De Natura Rerum Liber* in *Patrol. Lat.*, Vol. CX, cap. viii.

[24]Pt. I, Q. 68, Art. 2 discusses the various possibilities but seems to come to no definite conclusion except that "whatever these waters are, and whatever their mode of existence, we cannot for a moment doubt that they are there."

[25]Luther, *A Commentary on Genesis*, ed. Lenker (1904), p. 67.

[26]Calvin, *Commentarie*, p. 18.

waters above those heavens, which serve to mitigate the heat of the starres, and from whence that abundance of raine came, wherewith the world was overflowne: so Basil. hom. 3. Hexemer. Ambros. lib. 2. in Hexem. c. 2. Beda, with others. But this cannot be so: 1. for that the waters being of a heavie substance must be kept there against nature.[27]

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There were still conservatives like Sylvester Du Bartas who prostrated their reason before the altar of faith.[28] But it was a sign of the times that in 1626 even that redoubtable reactionary Alexander Rosse abandoned the supernaturalistic view on this question.[29]

The reasons for this shift of opinion are clear enough. The concept of unvarying physical law was growing stronger. And when the new science obliterated the solid spheres of the Aristotelian cosmos and extended the stars indefinitely upwards in space, little room or likelihood remained for waters above the stars. Raleigh in his *History of the World* (1614) used the favorite Copernican argument that to place waters above the rotating spheres "would add an unmeasurable greatness of Circle, whereby the swiftness of that first Moveable would exceed all possibility of belief. . . ." And based on it his conclusion, "For my self, I am perswaded that the Waters, called the Waters above the Heavens, are but the Clouds and Waters engendred in the uppermost Air."[30] Thus under the gaze of the new science the waters above the firmament dissolved in a shower of ordinary rain.

[27]P. 4. Williams, p. 55, points out that the better continental Renaissance commentators such as Pererius, Pareus, and Zanchius interpreted the waters above the heavens to be the moisture in the clouds.

[28]*Devine Weekes* (1605), Second Day of First Week, p. 69. Simon Goulart, *Learned Summary upon the Famous Poem of William of Saluste Lord of Bartas* (1621), pp. 87-88, summed up the opposing arguments noncommittally.

[29]*Exposition on Genesis* (1626), p. 5. Similarly, Samuel Purchas, *Purchas his Pilgrimage* (1613), Bk. I, chap. 2, p. 8; and George Hakewill, *An Apologie* (1630), p. 68. But see to the contrary John Swan, *Speculum Mundi* (1635), chap. 4, and Gerard Mercator, *Atlas* (1636), chap. 9, p. 17. Two earlier writers on navigation, Martin Cortes, *The Arte of Navigation* (1584), fol. 7r, and Peter de Medina, *The Arte of Navigation* (1595), thought the waters above the heavens signified the solid crystalline or ninth heaven, just above the fixed stars. A similar rationalistic shift in Renaissance interpretation of the Bible's account of Noah and the Flood is traced by Don C. Allen, *The Legend of Noah* in *Illinois Univ. Studies in Language and Literature* (1949), XXXIII, chap. 4.

[30]Bk. I, sec. 8.

Today it is popular in some quarters to cheer these various episodes as victories of science over religion. For thoughtful Elizabethans the thing was not quite so simple. Being Christians almost to a man, they believed that God discloses himself in some degree to human science in the world of nature. Then how could there possibly be any real conflict between such disclosure and that other revelation which God makes of himself in the written Word? The sole problem was to comprehend properly the meaning of the two revelations. So understood, they must harmonize. More, they must to some extent clarify each other. Scripture and Church supplied the right interpretation of science's facts in the light of God's supernaturally revealed attributes and purposes. Science in turn helped men to know when the Bible was speaking in language of accommodation or symbol. As the seventeenth century wore on, considerations like these led enlightened divines to a more and more conscious recognition of the truth that the discoveries of science are a gradual unrolling of God's meaning in Scripture. The process was growth, not surrender. Christianity and science both were victors.

Obviously not all divines either in England or on the Continent were enlightened, or much of their resistance to the new developments would not have stemmed so clearly from fear and pious inertia. But even among most reactionaries the opposition, we should do well to remember, was not to science as such. It was against the new science in favor of the old, which had become so deeply embedded in systematized theology as almost to partake of its sacred character. If the Roman Catholic Church at first opposed the new philosophy more stubbornly than did the Protestant, one reason lay in its greater loyalty to the medieval synthesis. Another was that the power of change rested solely in the control of a few theological specialists unaided by any widespread popular discussion of the Bible by Catholic laymen. But anyone looking back over the previous fifteen hundred years of Catholic absorption of scientific thought would be rash to deny that Renaissance Catholicism as well as Protestantism accepted in principle the idea that such thought should be a factor in understanding

the Bible.[31] Conversely, Protestantism's freer hospitality to the new science seems to have come in part from its rebellion against theological tradition, in part from the less authoritarian position of its clergy and their greater permeability by secular thought.

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Behind all such temporary fluctuations of attitude was emerging the great permanent faith, common to all denominations, that God's truth coming through science cannot contradict God's truth coming through Church and Scripture, but must somehow in its own limited field help to explain it. Science can never, of course, show the way to salvation. But in all matters pertaining to the processes of the created universe natural science elucidates Scripture and is the one supreme guide to truth.

IV

Beyond this usefulness to Scripture, beyond also its aid in easing the life of mankind on earth, natural science had for Elizabethans of all creeds the still higher function of showing something about the existence and attributes of God. The complexity, order, and beauty of the cosmos and of all its multifarious life declared unmistakably that it was first made by a Creator and thereafter continuously ruled by his loving Providence. Man's privilege, indeed his duty, was to discern the Creator in his creation. So to glorify God was the final aim of science.

"God doth make himselfe knowne unto us two waies," said the Puritan Arthur Dent in his *Plaine Mans Pathway to Heaven* (1612), "first by an inward knowledge naturally grafted in us, which is called the light of nature, Rom. 2. 14. and secondly, by other outward meanes."[32] What outward means? "Partly by his works. But most clearly by his word." And by what works?

[31]For the position of Augustine and Aquinas on the use of science in interpreting Scripture see Carré, pp. 19, 95. Resistance of the Catholic Church in Europe to Copernican doctrines is outlined by Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory* (Hanover, N. H., 1917), pp. 95-101. On the general question of medieval Catholic attitudes see Etienne Gilson, *Reason and Revelation in the Middle Ages* (1938), pp. 5-11 ff., and H. Richard Niebuhr, *Christ and Culture* (N. Y., 1951), pp. 76 ff.

[32]P. 4.

By the creation of the world. By the preserving and wonderfull government thereof, and of all the creatures therin, and their several actions.... They make knowne unto us, his eternall power, and Godhead: and thereby his wisedome, providence, goodnesse, justice and mercie; and consequently our owne weaknesse and unworthinesse, that we might learne thereby to worship him as God....

Such was the argument from design set forth in scores of similar religious treatises, popular or learned, Catholic, Anglican, or Puritan. And it had been from the beginning, of course, a feature of all Christian apologetics. Aquinas had said,

Now these two—namely eternal and temporal—are related to our knowledge in this way, that one of them is the means of knowing the other. For by way of discovery, we come through knowledge of temporal things to that of things eternal, according to the words of the Apostle (Rom. 1:20) *The invisible things of God are clearly seen, being understood by the things that are made....*[33]

In *A Golden Chaine* (1591) William Perkins, the Puritan theologian, declared, "That there is a God, is evident ... by the course of nature,"[34] and in his *Exposition upon Jude* (1606), that inducements to faith may be brought out of a study of nature.[35] The standard Anglican *Catechism* (1570) of Dean Alexander Nowell taught that "God is as it were in a glass beholden, and (so far as behoveth us) to be known in his works, and in the orderly course of the world."[36] The idea was indeed universal. "When I behold the heavens then I repent," cried Marlowe's learned Doctor Faustus, recoiling from sin. For, as Scripture announced, the heavens show forth the glory of God, and all the magnificent design of the physical world does so no less.

Some of the world's most momentous ideas are deceptively modest in appearance. By this argument from design Christianity accepted natural science as a valid instrument in the search for

[33]Pt. I, Q. 79, Art. 9; Robert Parsons, *The Seconde Parte of the Booke of Christian Exercise* (1590), pp. 46-49.

[34]In *Works* (1605), chap. 2, p. 1; Calvin, fol. 6r.

[35]P. 17.

[36]P. 146. Also James Pilkington, *Works*, ed. James Scholefield (1842), Parker Society, XXXV, 146.

God. In concert with two other major ideas—the idea that science must be praiseworthy because it was a gift of God, and the idea that its exercise was a Christian obligation to mankind—this idea that something might be learned about God from a study of his works was one of the mightiest forces drawing religion and science together. Through it the scientist could feel that his labors were pious and good, and the churchman could look upon them with favor so long as they subserved piety. Though this mutual acceptance was hedged around with doubts and qualifications on both sides, it was not seriously shaken in Elizabethan times and remains today, I think, essential to any harmonizing of scientific with religious thought.

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In summary, then, what is the Elizabethan theory of knowledge? For man in his earthly pilgrimage there are three avenues to knowledge: sense, reason, and divine revelation. By the partnership of sense and reason he comes to know the structure and present workings of the physical universe, which includes man in so far as he is a body; but of the origins, purposes, and destiny of this universe he must learn through the revelation granted him by God's love. About God and about his own soul, which are the realm of spirit subserved by matter, he knows the really important facts only by that same express revelation. But he has some inklings of them through what he sees of their operations in the world of matter and through his innate perceptions of moral and religious law. Thus, though science can never lead one all the way to God, it should be a step towards him. Yet without divine aid man cannot take even this one poor step, for all power is ultimately from God.

This is the orthodox view held by the great majority of Elizabethan Christians—theologians, scientists, and the general public. It interlinks science and religion at many points and tries to build upon them one solid edifice of thought and belief. It asserts that definite, reliable knowledge of both God and his world is attainable. There was, however, in Elizabethan England, a skeptical minority to whom we must now briefly turn.

3

Skepticism

The sceptic doth neither affirm, neither deny any position; but doubteth of it, and opposeth his reasons against that which is affirmed or denied, to justify his not consenting.

SIR WALTER RALEIGH, The Skeptic

ELIZABETHAN skepticism, in the sense which I shall use here, was by no means the same thing as atheism. The atheist (by the loose Elizabethan definition) denied or doubted God or some cardinal tenet of Christian faith. The Elizabethan skeptic, on the other hand, doubted the certainties of human sense and reason, but he exalted faith all the more for that very cause. Paradoxically, however, by thus exalting a naked piety he may well have weakened religion in depriving it of the supports of reason and science, notably the ideas that a study of the physical world discloses God and that God has bestowed upon his creature, man, a vigor and integrity of soul which makes the study successful. So the skeptic of the English Renaissance, though a Christian, tried to shatter the great orthodox consolidations of science with religion described in the foregoing chapter, and to depend on faith alone. In short, he became a fideist. Since the nature of a movement is often clarified by its past, we must look back to Greek antiquity where it began.

I

About the end of the fourth century B.C., as a reaction against the dominant dogmatic philosophies of Aristotle and the Stoics, a wave of doubt began in Greek thought, spreading from Pyrrho of Elis through the New Academy of Carneades and Arcesilas, and coming to final expression in the *Hypotyposes* of Sextus Em-

piricus (ca. A.D. 200).[1] It is important to realize that this ancient skepticism questioned not only man's senses and his reason but also his religious faith. Each individual, it argued, sees the same objects differently in the external world according to his different states of mind—in delirium, dreams, good health. Individuals also differ from individuals, nations from nations. Human senses are unlike, and perhaps inferior to, animal senses. A dog and a man looking at the same object may receive entirely different impressions. Animals in turn are unlike other animals; and so forth. Who can say which perceptions are right? What is true perception? Everything is subjective and relative. Similarly, in the activities of reason beasts may often achieve as much as we. And nowhere is there agreement between the thoughts of different men. Each philosopher arrives at a system unlike all others. Morals differ from country to country, from age to age, and from person to person. Religions likewise vary infinitely. There seems to be no objective criterion of truth in any area of human speculation. Let us therefore suspend judgment about everything under the sun. But since we have our lives to live, let us act according to what seems most probable in the light of the accepted customs of our own time and place.[2]

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Thus the skeptic negation of sense and reason undermined all the certainties of natural science and radiated outward to the highest principles of religion and ethics. Sextus Empiricus wrote in one book of his *Hypotyposes* against the natural scientists (The

[1]For accounts of the movement see Eduard Zeller, *The Stoics, Epicureans, and Sceptics,* tr. O. J. Reichel (1880), and R. G. Bury, Preface to his Loeb ed. of Sextus Empiricus (1949). In my brief survey I shall not try to distinguish between the various schools within the skeptical movement—between, for example, those who believed all things equally unknowable and those who admitted degrees of probability. Louis I. Bredvold, *The Intellectual Milieu of John Dryden* (Ann Arbor, 1934), chap. 2, has a capital interpretation of 16th- and 17th-century skepticism with its historical backgrounds.

[2]See the summary of the skeptical position principally in the *Hypotyposes* of Sextus Empiricus, Loeb Classical Library, but also in Cicero's *Academic Questions* (Loeb), esp. Bk. II; the life of Pyrrho in Diogenes Laertius, *Lives of the Philosophers* (Loeb), Bk. IX; St. Augustine, *Answer to Skeptics,* tr. D. J. Kavanagh, pp. 213 ff. All these sources were available to the Renaissance, besides contemporary works like those of Agrippa, Nicholas Cusano, and Montaigne embodying their doctrines.

Professors, as he called them) and in another book of the same work against the moral philosophers, concluding in effect, as Hamlet was to do, that "There's nothing either good or bad but thinking makes it so." Setting the various religions off against one another, Carneades deduced agnostically that there is no way of telling which to prefer.[3] Pyrrho, said Diogenes Laertius in his *Lives of the Philosophers*, customarily used a type of dialectic

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> derived from customs, laws, belief in myths. . . . This class includes considerations with regard to things beautiful and ugly, true and false, good and bad, with regard to the gods, and with regard to the coming into being and the passing away of the world of phenomena. . . . Different people believe in different gods; some in providence; others not. . . . As to what is true, then, let suspension of judgment be our practice.[4]

So universally corroding a negativism could not and did not become the prevalent mode of thought in either Greece or Rome at any time. But its existence was perhaps a symptom of a dangerous loss of momentum in contemporary religion as well as science, leading to a slow decline of both.

II

The attack on faith entailed by a full-blown skepticism could not, of course, survive the coming of Christianity. But neither, in the opinion of St. Augustine, should its attack on human sense and reason. He had lived through the long night watches of doubt and desolation and emerged with the conviction that the possibility of certitude must be defended equally on all levels of experience or be equally lost on all. Therefore while still a catechumen in the Church he wrote a special dialogue, *Answer to Skeptics*, to vindicate the validity of sense and reason as well as revelation. While formerly under the spell of skepticism, he testified, he had given up the search for all truth, becoming "lazy and utterly indolent; for I had not the courage to search for that which the

[3]Bury, p. xxxv; Cicero, Bk. II, p. 501.

[4]Bk. IX, p. 495.

most ingenious and learned men were unable to find."[5] The skeptical method he judged a menace not merely to philosophic truth but to religion itself because of their interdependence. Truth is one. This judgment he confirmed more maturely in *The City of God*:

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> As for the new Academicians, whom Varro avouches to hold no certainty but this. 'That all things are uncertain:' the Church of God detests these doubts as madness, having a most certain knowledge of the things it apprehends, although but in small quantity, because of the corruptible body. . . . Besides it believes the evidence of the senses in objects, of which the mind judges by the sensitive organs, though he would be in gross error that trusts entirely in them: it believes also the holy canonical Scriptures. . . .[6]

Augustine's protection of sensory and rational as well as revealed knowledge was to become a model not only for scholastic but for Renaissance Christianity, at least in its major trends.

The revival of classical skepticism in the Renaissance may be attributed to many causes, but the Reformation, despite its severe doctrine of the havoc wrought in man's nature by the Fall, does not seem to have been one of them. Everything said previously about Calvinism's belief in man's ability to learn validly of nature despite the stain of original sin implies a rejection of skepticism with regard to science. But there is no need to depend on implication. Calvin himself expressly branded such skepticism as "not onely against the worde of God, but also against the experience of common reason."[7] His disciple Beza condemned those who "have not been ashamed to say, that there is no certen knowledge to be had of any thing, and they have also gone about to proove by argument this their bold and intolerable assertion, thereby sufficiently refuting them selves."[8] Likewise in the Calvinist line

[5] P. 157, and summary on p. 220. Cf. the quotation from Bacon below and, to the same effect, Cicero, Bk. II, p. 493. The idea that skepticism led to inaction was always much stressed by its opponents.

[6] Bk. XIX, chap. 18. Also Aquinas, Pt. I, Q. 85, Art. 6.

[7] *Institutes*, fol. 80r.

[8] *Job Expounded*, sig. B6r & v.

of descent was Lambert Daneau, who explicitly refuted the claims of skepticism on religious grounds:

Because GOD hath not given those two partes of judgement unto men in vaine: to wit, reason of the minde, and sense of the body... the judgement of both which, althoughe it bee not most certaine in al things, and suffeciently subtile and exacte: yet is it not lyinge and deceived in al thinges.... For who will saye that the knowledge of so manye notable things and artes is worthily to bee dispised, which GOD, besydes the Scripture of his woorde, hath given unto men....[9]

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Hooker, Downame, and innumerable others in England simply took it for granted that accurate knowledge of the physical world was within man's power, and devoted themselves to discussing how it should be used.[10] Even Luther, as we have seen, crusty as he was on some occasions against Aristotle and pagan philosophy imported into divinity, did not deny that man's wit could achieve something in science. This was certainly the prevailing opinion among Elizabethan divines of all parties.

And for good reasons, many of which have already been set forth. The full support of Aristotelian epistemology underpropped the general confidence in sense and reason. Moreover, most divines were unwilling to dismember the body of rational theology by invalidating reason altogether. To have done so would have been to surrender reason's aid in confirming and interpreting revelation, in inferring the existence and Providence of God, and in reading the precepts of the moral and religious law inscribed on the human soul. God would then be conceived of as putting men into a world which they had no natural abilities to understand. The natural light would be quenched completely, and the supernatural light would remain alone as man's sole guide in the darkness. Reason and sense being to all intents and purposes quite gone, revelation and grace would be man's only avenues to truth. God would give man knowledge by a perpetual course of supernatural infusion. For most Elizabethan divines, who were not

[9] *The Wonderfull Woorkmanship of the World* (1578), fol. 14r.

[10] The problem, however, merges into that of the limits of knowledge, dealt with in the next chapter.

highly mystical but kept at least one foot in the present world, this was too large a price to pay for skepticism.

Yet it was a price which some of the more mystically minded were eager to pay and which even the more practical in some moods did not find too high. Otherworldliness was a recurring mood, more congenial to some individuals than to others. Usually it stopped short of complete skepticism about the natural world. Its characteristic temper was that of Thomas à Kempis' *The Imitation of Christ*:

> If I had al knowledge and had not love, what would that profit me afore God, who wil judge me according to my deeds?
>
> Studie not over ernestlie for knowledge: for that is but a vexation of the Spirit, and deceaving of the mind.[11]

Nevertheless Thomas à Kempis did not deny the possibility of earthly learning:

> And yet is not science, or knowledge to be contemned, because being rightlie considered it is good, and alowed of God. But for al that, the goodness of a man is better than his knowledge, and a good life is to be preferred before learning.[12]

The concern of Christian otherworldliness, then, was only to establish the relative values of learning and holiness more emphatically in favor of the latter. It devalued learning but did not deny it. In the same way, when Rollock warned, "Renounce that reason of thine, and take it captive, and make it a slave, otherwise thou shalt never see GOD to thy consolation for thy naturall reason is an enemie to God and His wisdom, Roman. 8:7.", he was decrying the advantages of reason for holiness, not insisting that reason had no capacities whatever.[13] Most Elizabethan otherworldliness did not, I think, go beyond this point.

But sliding past it almost insensibly into a genuine skepticism

[11]Tr. Thomas Rogers (1584), p. 3.

[12]P. 8.

[13]P. 112. I cannot find that skeptical argument was much employed by Elizabethan Catholics against Protestants or vice versa as was the case later in the 17th century, described by Bredvold, chap. 4.

was an easy matter. Bishop Joseph Hall tottered on its brink when, in order to show that faith was better than learning, he stressed the fallibility of the senses and of reason:

Do we see but a worm crawling under our feet, we know not what that is which in itself gives it a being: do we hear but a bee humming about our ears, the greatest naturalist cannot know whether that noise come from within the body, or from the mouth, or from the wings of that fly: how can we then hope or pretend to know those things which are abstruse and remote?[14]

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Some of his examples of how the senses are deceived sound definitely skeptical, but elsewhere he admitted that learning has its place.

Waiting for the churchman who wished to lash man's pride or to reject the whole mad irrelevance of human wisdom and science lay the book of Ecclesiastes and the admonition of St. Paul to beware vain philosophy. Thus Christianity had a long inheritance of its own which was not exactly skepticism but blended easily with it. This side of religion placed so low an estimate on the value of what man knew that it virtually and imperceptibly sometimes said he knew nothing at all. This transition is almost complete, for example, in Pope Innocent III's sixth-century *De Contemptu Mundi*, translated by George Gascoigne and much read by Elizabethans:

Let wyse men search narrowly, let them heedely consider the height of the heavens, the breadth of the yearth, and the depth of the Sea, let them argue and dispute every one of this . . . and in so doing what shall they fynde out of this busie toyle of our lyfe, but traveyle and payne? that knewe he by experience, which sayed: I enclyned by hart to know learninge, & prudence, error, and foolishnesse, and I perceyved that all was labor & affliction of the spyrite . . . yet is there scarcely any thing so vyle, or any thing so easy, that man can fully and thorowly understand it, nor that he can clerely comprehend it, unlesse perchaunce that is perfectly knowne, that nothing is perfectly knowne.[15]

[14]Quoted and discussed by Audrey Chew, "Joseph Hall and Neo-Stoicism," *PMLA*, LXV (1950), 1130-45.

[15]*The Droome of Doomes Day* (1576), p. 223.

Here the unimportance of knowledge gradually becomes the impossibility of knowledge. And pessimism of this sort in turn allied itself with the depreciation of man's body, "a stinking sperm or seed, a sack of dung, and the meat of worms" as Thomas Becon described it, quoting St. Bernard.[16] Thus Christian asceticism sometimes, but not usually, drifted over into a kind of practical skepticism of a native variety not necessarily derived from the classical school. Otherworldliness, asceticism, distrust of the senses, emphasis on faith as against reason, emphasis on original sin, depreciation of human learning, doubt about its possibility—all were factors whose changing interplay formed a complex attitude within Elizabethan Christianity. Its elements penetrated to some extent the main rational tradition, but it was not itself the main tradition.

As just indicated, otherworldliness did not usually entail an assertion that no certain knowledge of the physical world was attainable. Nor, of course, did it require any doubts about the certainty of Christian revelation. Consequently, the conclusion seems fair that skepticism, properly defined, had no strong foothold among Elizabethan divines. This was true even when Sextus Empiricus, Pyrrho, Agrippa, Montaigne, Nicholas Cusano, and the rest came to reinforce the tendencies of native Christian otherworldliness in the Renaissance. I have not been able to find an English clergyman in the Elizabethan period wholeheartedly given over to a skeptical view of man's senses and reason. The arguments of classical skepticism do seem to have been employed on occasion, but only on occasion, in such sermons as those of Bishop Hall, John Donne, and Peter Du Moulin with the moral intention of bringing down human arrogance. Take for example Du Moulin's *Heraclitus* (1608):

> And in conclusion, when wee have gotten all the precepts of this knowledge, it extends it selfe not far, and is of smale use: For man cannot by all his Philosophy attaine to the perfect knowledge of a small fly, or garden lettice, much lesse of his owne composition.... To speake more properly, our study is no labour, but rather an idle

[16] *Early Works,* ed. John Ayre (1843), Parker Society, II, 204.

action, which doth torment us without any hope of advancement: Like unto the Squirrills, that runne continually within turning Cages, thinking to get away, when as after all their paines taking, they still remaine in the same place.... One drop of wisdome, guided by the feare of God, is worth more then all humane learning.[17]

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But it is very difficult even here to distinguish between the classical doubt of all possibility of knowledge and the mere devaluation of the significance of knowledge in the manner of Christian otherworldliness.

As for Elizabethan scientists, if we examine the roster of all the hundreds of them the only one who comes to mind as a possible skeptic was the psychologist Thomas Wright.[18] That a scientist could be a skeptic is shown by the case of Sextus Empiricus himself, who was a physician. But skepticism is generally antagonistic to the spirit of science. Elizabethan astronomers, medical men, chemists, psychologists toiled and wrote their books in the faith that they were discovering and describing the real facts of nature. Otherwise most of them would have been doing something else. Theirs was usually an assumption, an unspoken faith, but occasionally it became ringingly vocal as in John Banister's dedication to his anatomical work, *The Historie of Man* (1578):

In fine, there is nothing so hie in the heavens above, nothing so low in the earth beneath, nothing so profound in the bowels of Arte, nor any thing so hid in the secretes of nature, as that good will dare not enterprise, search, unclose, or discover.[19]

Or in the declaration of the astronomer Robert Recorde that man had been given his eyes and his reason in order to acquire that true knowledge of science which takes him nearer to God.[20] As

[17]Pp. 34-39. See also *Sermons of John Donne* in *Works*, ed. Alford (1839), I, Sermon 27. On the other hand, Donne constantly preached that the book of the creatures is enough in itself to show us that there is a God; see esp. Sermon 21.

[18]The bulk of *The Passions of the Minde* (1604) was conventionally Neo-Aristotelian in its theory of knowledge, but on pp. 300 ff. were propounded a series of 120 questions decidedly skeptical in cast.

[19]Sig. A2v.

[20]*The Castle of Knowledge* (1596), sig. B3r.

a spokesman for science Francis Bacon in the *Novum Organum* pointed out that it was incompatible with skepticism, for

> when the human mind has once despaired of finding truth, its interest in all things grows fainter; and the result is that men turn aside to pleasant disputations and discourses and roam as it were from object to object, rather than keep on a course of severe inquisition.[21]

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Yet he considered skepticism, because of its insatiable inquiry, a less harmful foe to science than the dogmatisms which had hitherto frozen it into immobility. And it could be shown, I think, that Bacon's magnificent analysis of the errors of sense and the idols of the mind owed something to his study of the criticisms of Pyrrho and Sextus.

Among Elizabethans, therefore, both the scientists and the clergy as groups opposed skepticism of the human senses and reason. Skepticism of revelation was unthinkable for all the clergy and for all save possibly a few among the scientists. Only in a relatively small but illustrious group of lay intellectuals who were neither scientists nor divines did classical skepticism have any real force, and then only under the cloak of Christian fideism. Since in the name of religion they assaulted science along with all learning, the situation concerns us.

IV

According to Barnaby Rich[22] and Thomas Nashe[23] the skeptical thought coming into England in the last decades of the sixteenth century, especially through English translations of Agrippa's *Of the Vanitie and Uncertaintie of Artes and Sciences* (1569) and Sextus' *Hypotyposes*, gave much ammunition to bright young

[21]In *Works*, ed. Spedding et al, Bk. I, Aphs. 67, 75, 126. Bacon here reviewed the history of skepticism.

[22]In *Works of Thomas Nashe*, ed. R. B. McKerrow (1910), V, 118, McKerrow refers to Barnaby Rich, *Allarme to England* (1578), as specially mentioning the popularity of the Agrippa translation.

[23]Nashe mentioned in *Somewhat to Read for Them that List*, ed. McKerrow, III, 332, a recent translation of Sextus.

men who had a turn for witty paradox. To Nashe himself it was an intellectual toy of this kind.[24] But it struck deeper into the minds and hearts of others, among them Fulke Greville, Sir Walter Raleigh, Sir John Davies, Davies of Hereford, and John Donne. This impact had its full effect just at the turn of the century or shortly afterwards. Lacking space to go into the intricate literary and biographical aspects, I shall try only to give the gist of the movement as sufficiently revealed in the five writers named, although a number of others also were affected.[25]

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In the opinion of its latest editor,[26] Fulke Greville's philosophical poem, *A Treatie of Humane Learning*, was written between 1603 and 1605 as a reply to Samuel Daniel's *Musophilus* (before 1603) and Bacon's *The Advancement of Learning* (1605), both of them decidedly non-skeptical. Bacon's schemes for great plans of cooperative experiment need no description. Daniel thought of nature as "that immense and boundlesse Ocean" into which man makes rich voyages of intellectual exploration, returning with knowledge both useful and sound. Greville, on the contrary, held that original sin had utterly destroyed the power of human sense and reason to know anything with certainty: "False both the objects, Judge, and method be;/ What be those Arts then of Humanity?" In *A Treatie of Humane Learning* the poet took up in turn each of the sciences and, as Sextus and Agrippa had

[24]In *Pierce Penilesse his Supplication to the Divell* (1592?), ed. McKerrow, I, 191, Nashe declared himself "so unmoveablie resolved of the excellencie" of learning that he would not even enter into argument against the skeptics lest he might seem to countenance "so manifest a scandale." It is noteworthy also that James Sanford, translating Agrippa in 1569, felt impelled to tell the reader his personal opinion that "the whole circle or compasse of learning (the Seven Liberall Sciences I meane, called Encyclopoedia) is not to be neglected, and all humane Artes rejected." Few were willing to align themselves completely and irrevocably with skepticism. Still more decisive rejections of skepticism came from Philip de Mornay, *The Trewnesse of the Christian Religion* (1587), p. 274; Goulart, p. 19; Pierre Le Loyer, *A Treatise of Specters* (1605), chap. 6.

[25]E.g. George Gascoigne, *The Glasse of Government* (1575), in *Works*, ed. Cunliffe (1910), I, Act IV, ll. 68-69. There is a fair amount of skepticism in Lyly's plays.

[26]*Poems and Dramas of Fulke Greville*, ed. Geoffrey Bullough (1938), Introduction, pp. 53-54.

done before him, proved them all unreliable and based only on probabilities. That being the case, speculative knowledge is futile; above all we should not reduce God's mysteries to human reason. But since "God made all for use" the sciences must be given practical applications for the betterment of human life. Thus Greville reposed certitude only in faith and explained the loss of certitude in every other activity as due to the curse of the Fall. This was skepticism Christianized, but Christianized in a way that neither Catholicism nor Protestantism approved, since both these theologies assigned no such drastic consequences to the doctrine of original sin. On the other hand, the poem's stress on practice was almost Baconian and was at the opposite pole from Christian otherworldliness. No other Elizabethan poem was based on a skepticism so profound, consistent, and thoroughly reasoned.

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By contrast the *Microcosmos* (1603) of John Davies of Hereford[27] introduced merely a dash of classical skepticism as an aid to the moral and religious purpose of scourging human pride. The poem began with a stanza on the unreliability of the senses and hence of all sciences directly founded on them. Davies' third marginal note, "Every knowledge hath its beginning of the senses, which are often deceiv'd. Therefore all sciences which are deriv'd & fast rooted in the senses are uncertaine, & deceiptful,"[28] was in fact a quotation verbatim from Agrippa, *Of the Vanitie and Uncertaintie of Artes and Sciences.*[29] This skeptical opening, however, was not followed through. Thereafter Davies inconsistently praised poets as the first astronomers, implying that astronomy was anything but deceptive (p. 82). Also, in proving the soul's immortality, he pictured glowingly its power to know the heavens. Yet in a different section censuring the vice of pride in learning

[27]In *Works,* ed. A. B. Grosart (1878), I.

[28]P. 23.

[29]Tr. James Sanford (1569), cap. 7, fol. 21r&v: "For every knowledge (as they saie) hath his beginning of the senses, and the proufe of true speaches ... is that they agree with sensible thinges ... But sithe that oftentimes all the senses are deceaved, doubtlesse they cannot prove to us any certaine experience ... Wherefore al these derivations and sciences, whiche are faste rooted in the senses shalbe uncertaine, erroneous, & deceiptful...?"

he came back to the reminder that nobody really knows anything (pp. 83-87). Unlike Greville he made no great point of original sin as a Christian basis for his skepticism, partial as that skepticism was. In fact he gave no reasoned explanation of his occasional lapses into the attitude. For us the chief interest of his poem is to show how an Elizabethan layman might dip quickly in and out of skepticism as suited his purpose of moral castigation.

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There is a similar lesson in the much greater poem, *Nosce Teipsum* (1599), of Sir John Davies. The burden of the short introduction is that man knows nothing about his own soul and the soul knows nothing about the outer world, because of Adam's Fall:

> And yet alas, when all our lampes are burnd,
> Our bodyes wasted, and our spirits spent;
> When we have all the learnèd volumes turn'd,
> Which yeeld mens wits both help and ornament:
>
> What can we know? or what can we discerne?
> When Error chokes the windowes of the minde,
> The divers formes of things, how can we learne,
> That have been ever from our birth-day blind?[30]

The wisest men are those who are aware that they know nothing. A transition to the main body of the poem then is made by the idea that even the mind thus fallen can achieve knowledge through an added grace of God. The whole remainder of the work shows the poet, enlightened by this grace, describing in quite orthodox Neo-Aristotelian terms the processes of sense and reason by which the soul gets an immense knowledge of things—thereby proving its immortality. If cut off from its skeptical introduction, the poem could well serve as a quite average treatise on Elizabethan epistemology. Its position finally is much like that of Montaigne's *Apology of Raimond Sebonde*: man has no natural light by which to acquire certitude in anything and must depend on an extraor-

[30]In *Poems*, ed. Grosart (1869), Introduction, pp. 46-47.

dinary grace from God.[31] We have remarked before on the disagreement of this view with both Catholic and Protestant doctrine. In order to validate their skepticism Sir John Davies and Montaigne had to be more extreme in describing the disaster of the Fall than was Calvin himself. And it is not impossible that they and others like them were misapprehending the new Reformation doctrine of human depravity, not recognizing that the great reformers themselves restricted it to matters of faith and morals, and therefore applying it in the field of practical sense and reason, to science in short, where it was never intended to apply.

Raleigh's *The Skeptic* (date of composition unknown)[32] was a digest of classical skepticism on the fallibility of the senses but had considerably less to say about reason and nothing at all about faith. It mentioned no Christian dogma anywhere. In violent contrast stood Raleigh's other treatise, *The Soul*, which followed the orthodox line of Elizabethan epistemology including the acceptance of revealed truths from Scripture.[33] Raleigh's famous dinner table discussion with parson Ralph Ironsides about the ultimate definition of the soul involved problems not of epistemology but of ontology, of the ultimate nature of the soul, in which Raleigh shared the common opinion that outside of Scriptural revelation there could be no certainty.[34] In many passages in his *History of the World* (1614) Raleigh accepted the findings of science without doubt or cavil of any kind. When he did question a received scientific fact it was likely to be on the basis of some other scientific fact or theory. His general attitude towards human reason was favorable. He continued, however, to maintain that reason was powerless to understand essence, as dis-

[31] *Essays*, tr. E. J. Trenchmann (1927), II, 53: "Neither is it possible for man to rise superior to himself and humanity. . . . He will rise if God extraordinarily lends him a hand. He will rise by abandoning and renouncing his own proper means, and by suffering himself to be raised and uplifted by purely celestial means." Also I, 431, 439, 484.

[32] In *Works*, ed. Oldys and Birch (1829), VIII, 548-57.

[33] Ibid., esp. pp. 582, 587.

[34] *Willobie his Avisa* (1594), ed. G. B. Harrison (1926), Bodley Head Quartos, gives a transcript of the whole Cerne Abbas investigation, including this testimony. See pp. 265 ff.

tinguished from accidents, i.e., to tell what a thing really is, rather than how it behaves. Most of his strictures against Aristotelian metaphysics are explainable on this ground.[35] By conceding reason's ability to understand a thing's accidents, how it behaves, he preserved the field for science, inasmuch as science deals only with the behavior of things. Of his religious devotion there seems to be no serious doubt, but he may have had leanings toward anti-trinitarianism. I cannot find that *The History* is basically skeptical except in the popular sense that it sometimes uses reason to question old authority. To sum up, Raleigh can have been a full, philosophical skeptic only a very small part of the time, if at all.

Skepticism

In Donne's case skepticism seems to have stemmed from the new science more overtly and directly than in that of the other four men under discussion, although for them also the same kind of derivation in part is quite possible. We must not think of Copernicanism with all its accompaniments as decisively substituting a new truth for an old falsehood, forgetting that for nearly a hundred years after the publication of *De Revolutionibus* (1543) confusion and uncertainty were the consequences to many minds. Donne was one of those to whom the new philosophy succeeded only in calling all in doubt. These doubts he resolved, as Sir Thomas Browne did, on his knees, and finally clung wholly to religious faith. His *Anniversaries* (1611-12), written shortly before he took holy orders, are the chief monuments of his doubts expressed in terms of classical skepticism. And even in those poems the importance to be attached to the skeptical portions is complicated by the fact that they occur in an elegiac setting which traditionally was supposed to call forth the most gloomy thoughts the author could command.[36] The *First Anniversary* merely develops the idea of the decay of the world rather than of man's perceptions of it and therefore is skeptical, if at all, only in its

[35]E.g. Sig. D2v ff. For a full interpretation of Raleigh's thought read the excellent study by Ernest A. Strathmann, *Sir Walter Ralegh* (New York, 1951), esp. chap. 7.

[36]See also the article by L. L. Martz, "John Donne in Meditation," *ELH*, XIV (1947), 247-73, showing Donne's debt to the Catholic techniques of meditation.

description of the intellectual chaos wrought by the new science upon the old. In the *Second Anniversary*, however, man's ignorance in this world is given skeptical origins in the corruption of his reason and senses coming from original sin:

> Have not all soules thought
> For many ages, that our body's wrought
> Of Ayre, and Fire, and other Elements?
> And now they thinke of new ingredients
> And one Soule thinkes one, and another way
> Another thinkes, and 'tis an even lay.
> Know'st thou but how the stone doth enter in
> The bladders cave, and never break the skinne?
>
> * * *
>
> Why grasse is greene, or why our blood is red,
> Are mysteries which none have reach'd unto.
> In this low forme, poore soule, what wilt thou doe?
> When wilt thou shake off this Pedantery
> Of being taught by sense, and Fantasie?[37]

This ignorance is contrasted with the perfection of knowledge man will attain in heaven and, since it is not said to be remediable in this life by grace, it is treated rather as a permanent condition while man dwells on earth. Hence Donne's over-all pessimism seems deeper than that of the other poets mentioned, who imagine in various degrees a divine intervention to restore man's lost capacity for knowledge here. But like them he uses skeptical argument against sense and reason in order to urge a final resort to faith.

Thus in their several ways the literary intellectuals we have been discussing tended to argue from their skepticism of man's earthly knowledge to the need for a more rigorous religion. As most of them analyzed it, the source of complete human ignorance was original sin, the remedy God's extraordinary grace, and the objective a humbler, purer faith in God. Agrippa and Montaigne had already married their skepticism to Christianity in much the same way. Some solution of this kind was, indeed, mandatory for any Renaissance thinker who wished to be both a skeptic and a

[37] *Poems of John Donne*, ed. H. J. C. Grierson (1912), p. 258.

Christian. Sense and reason being discredited, he was left with faith alone as a means to certitude and therefore embraced it the more warmly, even desperately. In some minds—Montaigne's perhaps was one—the skepticism may really have extended even to faith, the brave language of Christian orthodoxy then serving only to save appearances to the world or to the skeptic's own divided conscience. But this is a problem for individual biography.

Speaking generally, it was none too easy to prevent skepticism, once adopted in respect to sense and reason, from engulfing faith also. Religion and morals had not been immune from the corrosions of Greek skepticism. And the same skepticism in its new Elizabethan garb no doubt led some Englishmen along the road from distrust of science to agnosticism in religion and perhaps finally to dogmatic atheism. Or beginning at the other end with religious unbelief, the already convinced atheist sometimes found skeptical arguments convenient for the shattering of Christian dogma. Thomas Nashe describes atheists as resorting to Pyrrhonism to destroy belief in Hell: "They followe the Pironicks, whose position and opinion it is that there is no Hel or misery but opinion."[38] Nor does it seem an accident that the Raleigh circle which produced *The Sceptic* should also have produced among some of its minor members the blasphemies against Scripture uncovered by the Cerne Abbas investigation in 1594. Of course, skepticism was by no means usually a prelude to atheism, nor was it the only factor working in this direction, but that it was sometimes an accompaniment of atheism, either as cause or as result seems clear.

Skepticism, in short, was an amorphous thing, opposed in theory to dogmatisms of every kind yet on occasion proving useful in practice both to dogmatic atheists at one extreme and to dogmatic fideists on the other. Likewise it was capable of blending in subtle combination with that Christian otherworldliness which despised human knowledge as a distraction from the quest for God. Most clergymen rejected it outright as an explicit philosophy. Some of them, nevertheless, found skeptical argument helpful to deflate

[38] *Christs Teares over Jerusalem*, ed. McKerrow, II, 116.

man's pride, a weapon to be taken up for the moment and then laid aside. For them skepticism was a transient, not a settled inhabitant of the mind. Even among the lay intellectuals most exposed to shifting winds of doctrine it possessed few minds wholly. With some of them, despite their febrile insistence on faith at the expense of everything else, it may well have been the outward sign of an insecurity of religious conviction. Though a professed enemy to science, skepticism probably did good service in helping to dissolve the old orthodoxies strangling scientific advance. It was a philosophy of uncertainty flourishing fitfully in a time of many uncertainties. But the very great majority of Elizabethans continued to believe that men could know something definite about the two worlds of matter and spirit. The next question was, how much?

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4

The Limits of Science

I

THE WORD "curiosity" had for the Renaissance a far more pejorative connotation than it has now. Today curiosity may kill cats, but it is generally regarded as good for men. Elizabethan theologians, however, since Eve's curiosity to learn the difference between good and evil had helped lead to the Fall, branded as "curious" the search for any forms of knowledge which they considered illegitimate. One problem highly important for us to determine, then, is to what classes of knowledge they were accustomed to apply the condemnation, and whether these included the sciences, or any one of them.

Certainly some very broad language, at first sight all-inclusive, can be found in many Renaissance works of theology, as in John Downame's *Guyde to Godlynesse* (1622):

> The other impediment, respecting the understanding, is vaine curiositie, when as neglecting to know those things concerning God and his will, which he hath reaveled unto us in his Word, we pry into his secrets which belong not unto us; spending our wits in spinning such Spiders webs, as are utterly unprofitable for any use.[1]

This sounds like an attack on the whole speculative intellect. The context, however, shows that Downame had in mind speculations about religion, and his only concrete reference to any science was to astrology. Similarly, Henry Smith in his *Sermons* (1593) began sweepingly; but mark the actual examples to which he descended at the end:

[1]Lib. 6, chap. 9, p. 787. When Peter Martyr Vermigli, in his *Common Places* (1583), pp. 332-33, discussed curiosity he gave only Biblical and dogmatic examples.

The first propertie is not to bee curious in searching mysteries: this *Paul* meaneth, when he saith, let no man presume to understand, above that which is meet to understand.... It is not necessarie to know that which God hath not revealed, and the well of Gods secrets is so deepe, that no bucket of man can sound it.... Some have a great deale more desire to learne where hell is, than to knowe any way how they may escape it: to heare what God did purpose before the world beganne, rather than to learne what hee will doe when the worlde is ended: to understand whether they shall know one another in heaven, than to know whether they belong to heaven....[2]

In the light of these specific instances the passage turns out to be an exhortation to practical religion, a censure of mere conjecture in spiritual matters, not a warning against science.

If the context is carefully watched, almost all Elizabethan pronouncements against curiosity have this same aim. When Calvin discussed the subject he meant speculation on what God did before he created the world, or why he did not fill up the empty space outside the universe, or "the nature, degrees, and multitude of Angels" and the time of their creation.[3] Bishop Hooper stigmatized as curiosity all attempts to question why God's Providence operates as it does;[4] Bishop Hugh Latimer, guesses as to who is to be saved and who damned;[5] Bishop Edward Reynoldes, probings into the nature of angels and the condition of the soul after it leaves the body;[6] Henry Bullinger, questions about the soul not revealed by Scripture and about the essence of God;[7] Francis Shakelton, predictions about the date of doomsday.[8] And so forth. In other words, the characteristic questions to which theology applied the decree against curiosity had to do with God, the angels, and the

[2]Pp. 996-97.

[3]Calvin, *Institutes*, fols. 43v, 44v, 73r; also *A Commentarie on Genesis* (1578), p. 19.

[4]*A Declaration of the Ten Commandments* in *Early Writings*, Parker Society, XX, 419.

[5]*Sermons of Hugh Latimer*, Parker Society, XXVII, 174.

[6]*A Treatise of the Passions* (1640), pp. 462, 498.

[7]*Decades*, Parker Society, IX, Decade 4, Sermon 3, pp. 126, 172-73; Decade 4, Sermon 10, p. 365.

[8]*A Blazyng Starre* (1580), passim.

soul of man, or with the world before its creation and after its ending, or with divine purposes beyond those disclosed in the Bible.[9] Here curiosity was synonymous with a search for the impossible, for man could never learn one iota more about such questions than God had already chosen to reveal. All such issues were either exclusively spiritual or at least so close to the spiritual that science claimed no jurisdiction over them.

The Limits of Science

On the other hand, so far as I can discover, the bar of curiosity was not applied by the Elizabethan clergy to recognized areas of science. Divines might say that astronomy and medicine, for example, must be studied humbly and for the ultimate glory of God, but they did not accuse astronomers and physicians of unlawful curiosity. Even Copernicanism when it came to probe deeper into astronomy might be called erroneous or blasphemous or, in the view of some churchmen, unimportant, but not curious, because it was active in inquiries admitted to be legitimate. After all, such refusal by the clergy to print the stigma of curiosity upon science as a whole was simply the negative consequence of their approval of science, as set forth in the three previous chapters. The result was that they restricted the doctrine of curiosity to matters of faith and morals, just as they did the doctrine of original sin. Both doctrines might have been used by theology to inhibit natural science but were deflected instead against types of spiritual weakness and unrest.

II

Yet it is necessary at once to add that Elizabethan divines also freely hurled the charge of curiosity against activities such as judicial astrology, alchemy, and magic, which they denied to be

[9]Sir Walter Raleigh, *History of the World* (1614), Pt. I, Bk. I, chap. 1, sec. 6, p. 6: it is curiosity to ask how God's spirit moved on the waters and the manner of the Creation but not its results. Robert Mason, *Reasons Academie* (1605), p. 6: it is curiosity to ask how large space was before God created the world. Marcellus Palingenius, *The Zodiake of Life* (1588), p. 97: man's inquiry must confine itself "within Dame Natures wall." La Primaudaye, *French Academie* (1594), Pt. I, chap. 15, p. 152: it is curiosity "to seeke for another beginning of all things, than God." See for additional quotations and discussion Don C. Allen, *The Legend of Noah* in *Ill. Univ. Stud. in Lang. and Lit.* (1949), XXXIII, 12 ff.

genuine natural sciences. The English Jesuit, Thomas Wright, in *The Passions of the Minde* (1604) complained typically:

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> Wee have in these our miserable dayes as curious a generation as ever was clasped under the cope of Heaven: for, what vaine studies, exercise (for most part) our judiciarie Astronomers, by calculating nativities, foretelling events, prescribing the limits of mens lives, foreshewing their perills and dangers, but meere cosinage, and vaine curiosity? How many labour night and day, spend their times and livings, in Alchymie, in searching forth that matchlesse stone which they never see, receiving no other lucre than a continuall baite to feed curiositie?[10]

As will appear in Chapter 10, the Church bitterly fought judicial astrology because its predictions impaired the freedom of man's will and his reliance on the Providence of God. The method of attack was to prove that astrology was not a natural science in that it was unable to demonstrate a sequence of physical cause and effect between the stars and the events predicted. The conclusion was that the predictions were false; human beings could not foretell the future; and efforts to do so were one more instance of a search for the impossible. Alchemy was in less disfavor, but it seemed too closely linked with black magic and pretended, moreover, to make transformations in matter of which God alone was capable.[11] Black magic of course was anathema because it entailed a pact with demons whereby the magician sought knowledge not permitted to other men.[12] Yet even here, said theologians, the illicit

[10] P. 315.

[11] William Perkins, *A Treatise of Callings* in *Works* (1605), p. 920: "Secondly, here the Alchymist is to be reprooved, that spends his time, and substance in laboring to change baser mettals into Gold, a thing in truth unpossible: for it is a kinde of newe creation, to turne one kind of creature into a creature of another kind, as every mettal is."

[12] For discussions of witchcraft as curiosity see Perkins, *A Discourse of Witchcraft* (1608), p. 11; Lambert Daneau, *A Dialogue of Witches* (1575), sig. E3r; King James I, *Daemonologie* (Edinburgh, 1597), p. 10, and other writers quoted in the chapter of Satan Exiled. Perkins wrote: "The second degree of discontentment, is in the mind and inward man; and that is curiositie, when a man resteth not satisfied with the measure of inward gifts received, as of knowledge, wit, understanding . . . but aspires to search out such things as God would have kept secret: and hence he is mooved to attempt the cursed art of Magick and witchcraft, as a way to get further knowledge in matters secret and not reveiled, that by working wonders, he may purchase fame in the world. . . ."

quest was likely to be in vain, for Satan himself had no more than a limited insight into natural law and usually imparted only crumbs of it to his victims, assuming that he did not delude them altogether. So from the viewpoint of the Church, the curiosity of astrologer, alchemist, and magician did not keep within the bounds of matter where science belonged but was a lawless as well as fruitless trespass on the province of spirit.

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To these charges the defendants entered a complete denial. Believers in astrology, among whom were numbered many of the most reputable Elizabethan scientists, tried to show chains of causation between the heavens and events on earth, concluding that their predictions had at least probability and were quite in accord with the workings of divine Providence. Alchemists stated the laws of metallurgy and chemistry as then understood. And magicians, or scientists accused of magic, insisted that they were engaged only in natural magic, the perfection of natural philosophy, requiring no traffic with devils. Thus they all joined issue with the clergy on the paramount question of what were in fact the proper boundaries of science, where the natural stopped and the supernatural began. And one reason for the disagreement was, I think, that most of the clergy took the Aristotelian definition of the natural whereas most of the astrologers, alchemists, and dabblers in magic rationalized their position by taking in essence the Neo-Platonic occult.

To state the whole distinction between the two would require a separate study in itself, but very briefly we may say that Aristotelianism explained the events of nature in terms of combinations and recombinations of elementary qualities of heat, cold, moisture, dryness given impetus by the heat of the sun and the motions of the revolving spheres. Its emphasis was on a dead matter and on the physics of that matter. The occult tradition going back to Neo-Platonism believed by contrast that the most important forces in the world of nature came not from the elements but from the hidden virtues transmitted to all physical objects by the stars from the intellectual world, which in turn emanated from God. It tended to blur the difference between matter and spirit, making

matter spiritual and spirit material. Its emphasis was on a matter almost alive, permeated with the divine, filled with secret sympathies and antipathies. "It is now manifest," said Henry Cornelius Agrippa in his *De Occulta Philosophia* (written in 1531),

> that the occult properties in things are not from the nature of the Elements, but infused from above, hid from our senses, and scarce at last known by our reason, which indeed comes from the Life, and the Spirit of the World, through the rayes of the Stars.... Wherefore, he that desires to enter upon this study, must consider, that every thing moves, and turns itself to its like, and inclines that to itself with all its might....[13]

John Dee's *Propaedeumata Aphoristica* (1558) expounded the same system. This was the theory that Jean Bodin in his *De la Demonomanie des Sorciers* (1580) attributed to the Florentine Academy, especially Pico della Mirandola, and traced back to Proclus, Iamblichus, Porphyry, and others of the early Neo-Platonists:

> ...les nouveaux Academiques ont posé ceste maxime, qui'l faut coupler & lier le ciel & la terre, les puissances celestes & terrestres, & conjoindre les uns avec les autres, pour attirer la puissance divine, par les moyens elementaires, & celestes. Voila l'hypothese de Procule, Iamblique, Porphyre, & autres Academiques. Sur laquelle hypothese on peut dire que le maistre en l'art Diabolique [Pico della Mirandola] . . . a fondé toutes les sorceleries & invocations des Diables. . . . Car il compose des caracteres, qu'il dict propres aux Demons de chacune planette, lesquels characteres it veut estre gravez au metal propre à chacune planette, à l'heure qu'elles sont en leur exaltation ou maison avec une conjunction amiable, & veut alors qu'on ayt aussi la plante, la pierre, & l'animal propre à chacune planette, & de tout cela qu'on face un sacrifice à la Planette, & quelquesfois l'image de la Planette....[14]

For Bodin and all the orthodox, these procedures were black magic; for the Neo-Platonist believers in beneficent planetary

[13] *Three Books of Occult Philosophy*, tr. J. F. (1561), chap. 15, p. 34; also pp. 2, 18, 24, 31, 48, etc. For discussion of the importance of astrology to all Renaissance science see Ernst Cassirer, *Individuum und Kosmos in Der Philosophie Der Renaissance* (Leipzig, 1927) pp. 107-108.

[14] Bk. I, chap. 3, p. 19v.

spirits and divine virtues transmitted by the stars to earth, they were religio-science.

This derivation of the inherent properties of things from the planets and stellar constellations made astrology essential to the Neo-Platonist. As against the crass Aristotelian physics, "the brablings of *Aristotelians*," as Raleigh called it, he favored a Lullian or Paracelsan chemistry,

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> which bringeth to light the inmost virtues, and draweth them out of nature's hidden bosome to human use: *Virtutes in centro centri latentes: Virtues hidden in the center of the center*, according to the *Chymists*. Of this sort were *Albertus*, *Arnoldus de villa nova*, *Raymond*, *Bacon*, and many others.[15]

Besides these medieval alchemists and pioneers in chemical medicine, Raleigh quoted copiously from Ficino and Pico throughout his discussion of natural magic, thereby recognizing its dual derivation from Neo-Platonic metaphysics and early experimental science.[16]

The fusion of the two currents was readily visible in the Paracelsan movement, which accordingly was stigmatized by some divines like Thomas Erastus in his *Disputationum De Medicina Nova Philippi Paracelsi Pars Prima* (1572) as demonic. R. B., the English Paracelsan, had to insist therefore in *The Difference betwene the Auncient Phisicke and the Latter Phisicke* (1585) that Paracelsus performed his cures by a perfectly natural magic:

[15]*History*, Pt. I, Bk. I, chap. 2, sec. 2, p. 202. See also the *First Anniversary*, *Poems of John Donne*, ed. Grierson (1912), p. 243, Donne's lament for the passing of natural magic:

> What Artist now dares boast that he can bring
> Heaven hither, or constellate any thing,
> So as the influence of those starres may bee
> Imprison'd in an Hearbe, or Charme, or Tree,
> And doe by touch, all which those stars could doe?

[16]There were cabalistic elements in it, too. The mixture did not appeal to Francis Bacon, who, while championing natural magic in principle, considered its Renaissance emphasis on sympathies and antipathies unfruitful. See *Works of Francis Bacon*, ed. Spedding et al. (1857-59), III, *The Advancement of Learning*, Bk. II, p. 361; *Novum Organum*, Bk. I, Aph. lxxxv.

Erastus doth besides these things finde great falte with the celestiall medicine of Paracelsus, saiyng they have their strenthe and power of the devilles and evell spirites . . . but in truith Paracelsus excludeth from the true, pure, and auncient Magike, and from his coelestiall medicine, all Nigromancie. . . .[17]

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It is only fair to add that in England Paracelsan medicine went virtually free of this sort of religious defamation.[18]

Believing that by such natural magic many ostensibly impossible wonders might be achieved, the Neo-Platonist tended to discount, though he did not altogether deny, the current hysteria against witchcraft, particularly because many of the methods commonly attributed to witches for summoning fiends—astrological and cabalistic symbols, preparation of metal seals to receive the planetary virtues, controlling physical objects by names and numbers—were methods which he himself recognized as efficacious to capture the powers of the celestial world for mastery of the physical. Therefore we are not surprised to find Reginald Scot, a believer in natural magic,[19] emerging as the leader of Elizabethan skepticism about witches. Knowing the possibilities of occult science, he was convinced that many of the marvels ascribed to persons called witches might be done quite legitimately by what he considered natural means. Per contra, when King James in his *Daemonologie* (1597) argued for the orthodox view that curiosity led to astrology and astrology to black magic, his underlying assumption was that such marvels could be effected only by demonic agency.[20] The real point of difference between the two men was in their concepts of the naturally possible, and this in turn rested on the difference between the Aristotelian and Neo-Platonic concepts of nature. James and Scot may stand as symbols of the disagreement between the predominantly orthodox, Aristotelian clergy on the one hand and the defenders of astrology,

[17]Chap. 24, sig. L3r.

[18]See Kocher, "Paracelsan Medicine in England," *Journal of the History of Medicine*, II (1947), 451-80; and the chapter on "The Physician as Atheist," below.

[19]*The Discoverie of Witchcraft* (1584), pp. 290-91, 301.

[20]P. 10.

alchemy, and natural magic on the other as to where the true boundaries of natural science lay. Or, in other words, where the doctrine of curiosity should apply.

On the whole, this disagreement does not seem to have affected future science adversely. The clerical assault on judicial astrology, whatever its religious motives, was certainly a boon to science. Opposition to alchemy, the ancestor of chemistry, might have been serious but was in fact always comparatively mild and soon dwindled away when chemistry under Paracelsism allied itself with medicine for the healing of disease. The worst damage came in the field of abnormal psychology, where clerical insistence on witchcraft and demonic possession caused incalculable human misery and perhaps retarded the rise of psychotherapy. But this science was to lie dormant anyway for centuries after witchcraft and possession had ceased to be taken seriously and is still only feebly stirring today.

The important fact that some scientists resisted the application of the doctrine of curiosity to the marginal sciences should not obscure the other important fact that they accepted the doctrine itself as a statement of general principle dividing the jurisdictions of the spiritual and physical worlds. Elizabethan scientists in the mass acknowledged that they must confine their studies within the physical, "within Dame Nature's wall." This world offered them a field boundless enough for all their scientific endeavors, and as Christians they claimed no other. They said with Rheticus in his *Narratio Prima*[21] that man cannot search beyond the fixed stars except through Holy Writ. Later frictions were to come, however, from materialistic encroachments by some scientists and philosophers of science upon the world of spirit, particularly in relation to miracles and to the human soul, sometimes leading ultimately to denial that there was any world of spirit at all. And this was to be another phase—spread far beyond immediate questions of astrology, alchemy, and witchcraft—in the controversy over the substance and scope of physical law.

[21]Edward Rosen, *Three Copernican Treatises* (New York, 1939).

III

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We must turn back now from the whole subject of the doctrine of curiosity, which has led far afield, to consider another aspect of the main question, What are the limits of science? Not in the marginal sciences but within the areas of natural inquiry which everybody recognized as legitimate, *were* there limits of human penetration, barriers past which the mind of man could never go? If so, were they far off or near, or had they possibly already been reached? The tone of the answers given was obviously important to the morale and forward drive of Elizabethan science.

As usual, attitudes of the clergy bore an emphasis subtly different from those of the scientists themselves. Since a preacher was responsible for helping men to save their souls, his disposition always was to remind them of their equality before God, to chastise the pride of the learned, and to reiterate the absolute superiority of piety over all forms of human knowledge. He believed that the whole sum of science neither was nor could be great when looked at in comparison with the immensity of the universe. But within this religious outlook common to divines of all creeds there was room for many variations in degree. All might subscribe to Hooker's idea that man would never know everything about natural laws:

> . . . natural agents, which keep the law of their kind unwittingly, as the heavens and elements of the world . . . their strict keeping of one tenure, statute, and law, is spoken of by all, but hath in it more than men have as yet attained to know, or perhaps ever shall attain, seeing the travail of wading herein is given of God to the sons of men, that perceiving how much the least thing in the world hath in it more than the wisest are able to reach unto, they may by this means learn humility.[22]

For Ecclesiastes 3: 11 declared that "no man can find out the work that God maketh from the beginning to the end."

Others like Martin Fotherby, Bishop of Salisbury, in his *Atheomastix* (1622) contracted the scope of science a little farther:

[22] *Laws of Ecclesiastical Polity*, ed. John Keble (1888), Bk. I, chap. 3, p. 155.

... though all the several Arts and Sciences in the world (which are in number infinite) have beene devised, and invented by the wit of man: yet had never any man so infinite a wit, as to know and understand the depth of all of them. Nay, no man of any of them.[23]

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The next lower step was that of preachers like Henry Smith and Henry Bullinger who simply said that man's ignorance far exceeds his knowledge.[24] Probably that was about where most divines stood on the problem. Some, like S. I. in *Bromleion* (1595), thought more specifically that man could come only to the doorway of science, "in the very enterance, as though he had but a glimpse of some, and not a sight of all...".[25] And a pessimist like Donne in the Sermon for Whitsunday, 1628, might see knowledge as a treadmill on which laboring humanity could make only illusory advance:

And yet, here in this world, knowledge is but as the earth, and ignorance as the sea; there is more sea than earth, more ignorance than knowledge; and as if the sea do gain in one place it loses in another, so is it with knowledge too; if new things be found out, as many, and as good, that were known before, are forgotten and lost.[26]

The conclusion to most such exhortations, however, was not that man should stop working at science but that he should work humbly and remember his soul. Therefore the religious belittlement, while a potentially discouraging factor, was no more than that. A scientist might accept almost any one of the attitudes just outlined, except that of Donne, which was not widespread, and yet be stirred by the vastness of the unknown as by a challenge. For religion did not assert that the whole of the unknown must

[23]P. 185.

[24]Smith, *Sermons* (1593), p. 992; Bullinger, Decade 4, Sermon 4, p. 174: "...what is he at this day, which although he use the aid and industry of the most learned writers, is not compelled to wonder at more and greater things than either they ever did, or he ever shall, attain unto?"

[25]P. 109.

[26]*Sermons of John Donne* in *Works*, ed. Henry Alford (1839), I, Sermon 27, p. 536. Cf. Downame, *Second Part of Christian Warfare* (1611), p. 93, who warned against "being never satisfied, but ever curiously prying into the very hidden bowels of natures secretes: for the Apostle telleth us, there is a measure of our understanding, as well as of our stature... Romans 12. 3." That is, Downame placed no boundary but implied that there was one somewhere.

remain the perpetually unknowable. It spoke only in the comparative: the knowable is small in comparison with the unknowable. By this proportion the knowable might yet be vast.

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Moreover, even theology sometimes found occasion to appreciate rather than depreciate man's capacity for knowledge. When the clergy reasoned for the immortality of the soul they used the staple argument that its vast powers of understanding were a sign of its divine nature and survival after death. So Calvin wrote in the *Institutes*:

> Finally forasmuch as so many excellent giftes wherewith mans minde is endued, do crie out that there is some divine thing engraven in it, there are even so many testimonies of an immortal essence. For that sense which is in brute beastes, goeth not out of the body, or at lest extendeth no further than to things presently set before it. But the nimblenesse of the mind of man which veweth the heaven and earth and secretes of nature, & comprehending all ages in understandyng and memorie, digesteth every thing in order, & gathereth things to come by things past, doeth playnly shewe that there lieth hidden in man a certaine thing severall from the body. . . .[27]

The same attitude, often in almost identical language, permeated the case for immortality presented against atheists and infidels by such Christian apologists as John Dove, Martin Fotherby, Robert Parsons, Sir George More, and Philip de Mornay.[28] It was expounded in detail by writers of standard treatises on the soul like Peter de la Primaudaye and Sir John Davies[29] and was, indeed,

[27]Fol. 51v-52r. See also Bullinger, Decade 4, Sermon 10, p. 377, quoting from St. Augustine (*Ep. 28 ad Hieronymo de Natura et Origine Animarum* and *De Quantitate Animae*) a lyrical description of the soul's powers: "And here weigh with me the wonderful power of understanding and reasoning . . . consider with me so many devices of craftsmen, tilling of lands, building of cities . . . the inventions of so many forms in letters, in words, in gesture, in sound, in pictures and feigned shows; so many tongues of nations, so many things ordained, so many new things, so many things reformed; such a number of books . . . cunning in measuring, readiness in numbering, conjecturing of things past and things to come by things present."

[28]Dove, *A Confutation of Atheisme* (1605), pp. 26, 73; Fotherby, chap. 2; More, *A Demonstration of God* (1597), p. 51; Mornay, *The Trewnesse of the Christian Religion* (1587), chap. 1 ff.; Parsons, *Seconde Parte of the Booke of Christian Exercise* (1590), p. 36.

[29]La Primaudaye, *French Academie*, Pt. II (1605), chaps. 98-99; Davies, *Nosce Teipsum* (1599) in *Works of Sir John Davies*, ed. Grosart (1869), I, 124-61.

likely to turn up in some form in almost any work on psychology whether by a layman or by a divine. Nor was it restricted to the argument for immortality. Theologians discussing man as the image of God, or as superior to the brute, or as part of the excellence of God's whole creation often praised his powers and acquisitions in knowledge. In fact the same clergyman who in these contexts placed man little lower than the angels might in other contexts, designed to castigate human pride, place him not much above the beasts. Where the emphasis came, then, was often determined by the immediate theological aim. And the total result was that the scientist could find, if he pleased, in some aspects of theology itself materials for a high estimate of the possible range of human knowledge.

Whether or not this range had a boundary did not really matter to the scientist so long as the boundary was sufficiently remote. Francis Bacon was perfectly willing to agree with Richard Hooker that the ultimate bases of natural law might be inaccessible to man, but in *Of the Interpretation of Nature* he was careful to point out that, even so, a huge space remained for human exploration:

> And although the highest generality of motion or summary law of nature God should still reserve within his own curtain, yet many and noble are the inferior and secondary operations which are within man's sounding. . . .
>
> . . . But notwithstanding these precincts and bounds, let it be believed . . . that the new-found world of land was not greater addition to the ancient continent than there remaineth at this day a world of inventions and sciences unknown, having respect to those that are known. . . .[30]

Other scientists, however, preferred to claim the whole of nature for science without any qualification whatever. I have quoted elsewhere John Banister's statement that there was not "any thing

[30] *Works*, III, 220, 223. Bacon's view of the impossibility of man's knowing the summary law of nature is expounded by Fulton H. Anderson, *The Philosophy of Francis Bacon* (Chicago, 1948), pp. 65-67. See also Samuel Daniel, *Musophilus* in *Works*, ed. Grosart (1885), I, ll. 809-42: Men should "set their bold *Plus ultra* farre without . . . / In that immense and boundlesse Ocean/ Of Nature's riches. . . ."

so hid in the secretes of nature, as that good will dare not enterprise, search, unclose, or discover."[31] And Philip Barrough in his *Method of Phisick* (1596) contended similarly that "there is nothing within this mortall circuite that God hath, as it were kept to himselfe, and not made subject to the industrious capacitie of man."[32]

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Whether voiced in this categorical fashion or whether, as more commonly, stated with greater moderation or merely implied in their obvious zest for achievement, some such faith as this animated Elizabethan scientists as a group. Understandably, it was at its strongest among those who rebelled against Aristotle in cosmology and logic, and against Galen in medicine and chemistry. They had to believe in immeasurable new distances for science. John Hester, the Paracelsan spagyrist, spoke for them all when he said that the human mind must insatiably "range foorth into the large and wide fields of nature" because they "so carie a privilege of more libertie in search, and large scope in practise, that to rest contented with the inventions of other, is as odious to the learned, as it is for francke hearts to feede on other mens trenchers. . . ."[33] To men of this stamp the mild, vague, and by no means unanimous pessimisms of the clergy were no deterrent. Religion did not say, and in the nature of the case could not say, exactly where man's capacity to know the physical world ended. Hence the scientist had not merely elbow room but room for a full sweep of the arm and space beyond.

IV

Associated with the foregoing problem of limits of penetration for the human mind were two others, themselves closely allied: the problem of limits of time imposed on all the accumulations

[31] *The Historie of Man* (1578), sig. A2v.

[32] Sig. A4r: also William Bullein, *Bulwarke of Defence* (1562), fol. iir; Nicholas Gyer, *The English Phlebotomy* (1592), sig. A3v.

[33] Paracelsus, *A Hundred and Foureteene Experiments and Cures,* tr. John Hester (1596), the Dedication to Raleigh. See also other Paracelsan writings, *Philiatros* (1615), fol. 12v, and R. B.'s *The Difference betwene the Auncient Phisicke and the Latter Phisicke,* passim.

of science by the coming end of the world and the problem of limits of upward progress perhaps imposed by a steady deterioration of the human race since the days of the ancients. We may reserve the second for a moment.

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The idea that the universe must some day be destroyed by fire was, of course, an article of Christian faith, stated in the book of Revelation and forecast by prophecies in Daniel and the apocryphal Esdras. Moreover, the end of cosmic history was to be signalized by the second coming of Christ, the resurrection of the dead, and the Last Judgment. The doctrine therefore lay very close to the heart of Christianity. But it also concerned science because on the length of time thought likely to intervene before doomsday depended the incentive of the scientist. A long span or even a moderately short one would give him reason for working, but an extremely short one would not. Now under the accepted Renaissance chronology that the world was created about 4000 years B.C. and was to endure for no more than 6000 years, mankind had at the end of the sixteenth century roughly a maximum of 400 years to survive. And even this maximum would probably be curtailed by God as soon as the number of his elect had been filled. The end of the world, preached Hugh Latimer in a sermon in 1552,

> no doubt is not far off. For the world was ordained of God to endure, as scripture and all learned men agree, six thousand years: now of this number are gone five thousand five hundred fifty-two, so that there is left only four hundred and fifty lacking two: and this is but a little time; and yet this time shall be shortened, as scripture plainly witnesseth, for the elect's sake: so that peradventure it may come in my days, as old as I am; or in our children's days. Therefore let us begin to strive and fight betimes with sin. . . .[34]

The conclusion was characteristic. Latimer appealed to the idea of the imminence of doomsday in order to make his hearers look urgently to the state of their souls. Other preachers did the same. Francis Shakelton, minister, wrote *A Blazyng Starre* in 1580 to

[34] *Sermons and Remains of Hugh Latimer*, ed. G. E. Corrie (1844-45), Parker Society, XXVIII, 52-53.

warn that the comet of that year was "set on fire by Gods providence, to call all sinners to earnest & speedie repentance" because it betokened the second coming of Christ, "whiche by many manifest and inevitable reasons I gather, can not bee fare off."[35] As further evidence he cited the earthquake of 1580 and the nova of 1572. Theodore Beza likewise published verses later translated in Sheltoo a Geveren's *Of the Ende of this Worlde* (1577) hailing the 1572 nova as a return of the star of Bethlehem and a forerunner of the returning Christ:

> This is that Starre, which to the Citie small of David Kyng,
> The three Wyse men sometyme from out the East did thither bryng.
> And that which once when Christ was borne, did lead them with his light
> Returnyng now declares, that Christ returnes agayne in might.
> Wherefore you blessed crue of Saintes, and godly men be glad,
> And bloody tyrant Herode, stand in feare, and be thou sad.[36]

Geveren himself adopted the same explanation, and relied besides on recent eclipses of sun and moon, ominous conjunctions of planets, earthquakes, droughts, plagues, and the like, all of which should serve to "draw the wicked from securitie."[37] The volume of this type of thinking among Elizabethan divines was substantial. They were disposed to believe that doomsday, if not precisely at hand, was only a short way off; they used the idea as an aid to religious exhortation; and they derived their proofs in part from astronomical, astrological, and seismological phenomena which science itself at the time was investigating. But, as we shall see in the chapter on Providence, they liked to explain these phenomena as miracles rather than as the effects of natural law.

There is no need to labor the obvious fact that this kind of religious attitude, wherever it existed, was unfavorable to the growth of science. True, the eyes of these clergymen were on doomsday as a spiritual event only, and I have not found them as a rule drawing from it any explicit verdicts against science. They

[35]Epistle Dedicatory and sigs. B6r, D3r.
[36]Verso of the title page.
[37]Fol. 10v, etc.

said, judgment is near, therefore repent; not, judgment is near, therefore abandon your study of nature. But the latter conclusion more or less inevitably followed in the atmosphere of emergency thus created, because the study of nature led only indirectly to God.

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Yet there were mitigating factors. Even those of the clergy, and their followers among laymen, who cried that the end of the world was very near did not say that it would come tomorrow, or the next day, or on any specific day. It was generally agreed that no human being could foretell the date of doomsday. Bishop John Jewel and many others inveighed bitterly against astrologers who made any attempt to fix it,[38] and when Richard Harvey argued in *An Astrological Discourse* (1583) that the conjunction of Jupiter and Saturn in 1583 was the same as when Christ came to earth and consequently might foretoken his second coming, he was careful to be highly tentative.[39] So was Robert Tanner in his *Probable Conjectures* for the same year, and Geveren in his gloomy prognostications for 1584 and 1588. Caution of this sort was dictated not only by obvious fear of error but also by a realization that it was not common sense to rouse mass hysteria which would stop all the processes of society while everyone waited for the sound of the last trumpet. Consequently the aim of the clergyman who thought doomsday close was to make it seem imminent but not too imminent.

Furthermore, the numbers of those who thought so should not be exaggerated. The consensus among the clergy, as among intelligent laymen, simply was that the world was in its last age but that, within the Biblical limit of 6000 years, no way existed of telling when that age would end. Most divines most of the time did not write or act as if the end were to be expected next week or next year. The number of sermons in which doomsday was never mentioned exceeded those in which it was mentioned by perhaps at least fifty to one. And one reason probably was that

[38] *Upon the First Epistle to the Thessalonians*, ed. John Ayre (1845-50), Parker Society, XXIV, 872.

[39] Pp. 16, 41 ff.

preachers found the individuals in their congregations more worried about their own deaths than about the general death of humanity. Most handbooks of morals, treatises of conscience, exegeses of scriptural texts and the like followed in the same direction. The idea of doom likewise was not prominent in the more systematic theological works of William Perkins and John Downame. Also the various ecclesiastical controversies of the period, the vestiarian, the Marprelate, the disputes with the Catholics over the translation of Scripture, and so forth, came and went without the participants believing that all would soon be buried in a common destruction. In short, most Elizabethans, in holy orders and out, tended to act as if the world would last long enough for all practical purposes. The idea that the end was near rested in the back of the clergyman's mind and might be hurried to the front by any greatly astounding spectacle in the heavens, by earthquakes, vast floods, and unprecedented epidemics which seemed portents of the apocalypse impending. But for most divines the idea does not seem to have been a constant and overshadowing presence.[40]

In this atmosphere scientists could breathe, though not with entire comfort. As Christians almost all of them presumably admitted that the world must end and was already in its last age. But virtually none of them ever alluded to the fact. It was outside their province, a matter which they left to the theologians. Bacon was therefore more explicit than most when in the *Novum Organum* he said,

> Nor should the prophecy of Daniel be forgotten, touching the last ages of the world:—'Many shall go to and fro, and knowledge shall be increased;' clearly intimating that the thorough passage of the world (which now by so many distant voyages seems to be accomplished, or in course of accomplishment), and the advancement of the sciences, are destined by fate, that is, by Divine Providence, to meet in the same age.[41]

[40]This conclusion is necessarily based on negative evidence, but when we are trying to judge the ubiquity of an idea in a period, knowing where it does not occur is quite as important as knowing where it does.

[41]Bk. I, Aph. 93.

Here his concession that the world was in its sunset became the basis for a claim, founded on the book of Daniel, that Scripture prophesied the finest flourishing of the sciences in these last times. And he said nothing whatever about the time being short. In another passage, in *Of the Interpretation of Nature,* his admission of the coming end was even more perfunctory and his stress on the immense discoveries still achievable by man even more hopeful.[42] Generally Bacon put the idea of doom out of his mind and quietly assumed that the time remaining was sufficient for the accomplishment of his own boundless visions for science.

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This same quiet assumption was made by Elizabethan scientists as a group. They did not discuss it; they merely went ahead with their work. Gilbert labored in magnetism, Harriot in mathematics and optics, without noticeable discouragement from the idea of doom. The nova of 1572 which meant to Beza, Shakelton, and Geveren the approach of judgment suggested no such thought to John Dee and Thomas Digges, who tried to calculate its parallax. Similarly, the 1580 earthquake was to Gabriel Harvey the natural result of subterranean winds, not the forerunner of catastrophe which it seemed to the Church of England.[43] Scientists thus having their own views of some of the phenomena which were relied upon by some of the clergy as signs of doom were inclined to postpone the date from the immediate to the indefinite future. As in other instances we have noted, the pronouncements of religion on the nearness of the world's end were too vague and too divided among themselves to discourage men who were absorbed in the pursuit of science, considered it useful to humanity and serviceable to God, and were determined to labor before the night, possibly distant, should come. Whether such pronouncements did in fact discourage less determined men who might otherwise have proceeded in science is a different question, but this we have no means of answering.

[42] *Works,* III, 222-23.

[43] *Letters between Spenser and Harvey* in *Works,* ed. Grosart (1884-85), I, 51 ff. See chapter on Providence below.

V

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Probably more fundamentally dangerous to science was that other idea, commonly but not invariably connected with the idea of world's end, that nature and human capacity were irreversibly decaying. This conception is to be distinguished from that of original sin. The latter doctrine held merely that man's powers, and with them the first perfection of the cosmos, had suffered a mighty damage by his Fall but not that they continued to diminish ever afterwards. The conception of decay, on the other hand, was that these powers were still growing feebler and would do so until the final cataclysm. The universe was running down, and man with it. Therefore men of the present might inherit the scientific and other achievements of their forefathers but could not hope to equal them.

Unlike the idea of world's end, this idea of decay was not an article of Christian faith. The good Christian was free to believe that the cosmic processes and man's abilities had not changed since the Fall, or even were improving, and that the end would come through an instantaneous act of God, not as the culmination of a gradual collapse. In fact, however, the idea of decay had long ingratiated itself into Christian thought. It had support in the verse of Psalm 102, that the heavens and earth shall wax old like a garment, in the apocryphal Esdras, and in early Fathers like Cyprian and Augustine;[44] also in the fact, as reported by Scripture, that men before the Flood far exceeded men of the present in longevity and giant size. It mingled well with the elements of pessimistic otherworldliness in medieval devotion. And the Renaissance not only received it from the Middle Ages but rediscovered it in other forms in Greek and Roman allusions to a lost golden age and in their cyclical theory of history.[45]

[44]Discussed in that excellent study by R. F. Jones, *Ancients and Moderns* (St. Louis, 1936), chap. 2, p. 24, also p. 291. For a good analysis of the religious contribution to the idea of progress see Ernest L. Tuveson, *Millennium and Utopia* (Berkeley, 1949), and works cited by him. Cf. also Victor Harris, *All Coherence Gone* (Chicago, 1949), esp. chaps. 1, 4, and 5, and George Williamson, "Mutability, Decay, and Seventeenth Century Melancholy," *ELH*, II (1935), 121-51.

[45]John B. Bury, *The Idea of Progress* (London, 1928), pp. 9 ff.

By Elizabethan divines the idea of retrogression was invoked to point up the unprecedented sinfulness of the times and the need for a special effort at reform. Contrasting the olden days when "at the beginning men so obeyed reason," Bishop John Hooper admonished,

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> But now are we fallen into the last time and end of the world, wherein for reason ruleth lust . . . for scarce is there one of a hundred that love to seek wisdom and knowledge of reason and of arts that other men found out and left unto us. And as for the pains and travails of war, let every man judge and consider himself, whether our weak nature can suffer as much as David, Achilles, Cyrus, Alexander, Hanibal, Marcellus, Scipio, C. Caesar, and other did. Then shall we perceive that nature now in man consumed, effeminated, and worn out, is a thing most unable to do that fore-age hath done. Therefore have these latter days more need of much teaching in civil causes than the old age before us, which better and more modestly governed themselves by only reason, than now we do by God's word and reason. And this is not known only by the holy scriptures, but also by profane writers, that declare with the age of the world to increase iniquity.[46]

For Hooper, then, what he regarded as the worsening of morals in his day was the chief target, while the inferiority of the moderns to the ancients in physique and learning was an incidental accompaniment. Francis Shakelton's object in *A Blazyng Starre* (1580) likewise was to awaken the world from sin, but he went farther by calling upon science itself to prove that the world machine was falling to ruin. The sun, he said, "if wee will give credite to the Mathematiques . . . is nerer unto us by 9976 German miles than it was before," and since it now sheds less warmth and power to the earth "there is lesse vertue in Plantes and hearbes than ever was before. And more feeble strength in every living creature than ever was before."[47] Another clergyman, S. I., in *Bromleion* (1595) turned the argument from decay to the same religious purpose by appealing to the evidence of pharmacology and medicine. Herbs lose their properties

[46] *Later Writings,* ed. Charles Nevinson (1852), Parker Society, XXI, 83.

[47] Quoted by Jones, p. 25.

and the Phisitian is driven to uncertainties. The bodie of man is not so perfect and healthfull as in the beginning, but subject to manifold diseases, his time holdeth not out to hundreths as heretofore it hath done, but fewe are his daies, because his daies are evill.[48]

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Thus some clergymen tried to find in science proofs for the doctrine of decay, using that doctrine in turn to reach the consciences of their parishioners. But these proofs were drawn from the older Galenic and Aristotelian science rather than from the new developments in astronomy and medicine, which offered no comfort to the idea of decay. It required a wizard of paradox like John Donne to treat the advances of the new science as symptoms of cosmic and human degeneration.

One must stress, however, that a majority of Elizabethan churchmen did not usually resort to the idea of a continuing decay when they censured the present corruptions in manners, morals, and faith. They might indeed contrast them with the sturdier honesty and piety of immediately preceding generations, before classical and Italian vice had poisoned England. But as a rule their theory of human impairment ended with the Fall, and they did not view the intervening ages since then as one long descent. Still less were they likely, except for a few who had a scientific turn of mind, to indulge in a full-blown theory of universal deterioration drawing proofs from astronomy, physiology, botany, and medicine. Yet in essence such a theory was necessary to explain the deterioration of man, because it was the creeping disorder and enfeeblement of the whole celestial apparatus, notably the failing vigor of the sun, that transmitted weakness to all life on earth, including man. With some exceptions like Francis Shakelton and Godfrey Goodman,[49] it was not so much among the divines as among the poets and scholars of the Elizabethan age that the theory in its fully developed form was most likely to be found. And by them it was given some very diverse applications.

Edmund Spenser, for example, used it for a moral purpose

[48]P. 112.

[49]*The Fall of Man* (1616).

resembling that of the clergy. His Proem to Book V of *The Faerie Queene*, the theme of which was Justice, expounded in detail the senility of heaven and earth in order to show how injustice flourishes in a world which "being once amisse growes daily wourse and wourse" (Stanza 1). As a basis for this moral pessimism he quoted the findings of modern astronomers that the configurations of the heavens, and particularly the paths of the sun and the planets, were quite different from what they had been in the days of Ptolemy and earlier. Misinterpreting as did many others the fact that the angle of the ecliptic with the celestial equator was slowly decreasing year by year he noted that the sun

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> . . . since the terme of fourteene hundred yeres,
> That learned Ptolomaee his hight did take,
> He is declyned from that marke of theirs,
> Nigh thirtie minutes to the Southerne lake;
> That makes me feare in time he will us quite forsake. (Stanza 7)

Likewise misinterpreting the discovery that the planetary orbits were not perfectly circular, he found in the apparent irregularities of Mars and Saturn symptoms and causes of a universal decay expressing itself in the growing vices of man (Stanza 8).[50] All this did not involve any choice by Spenser between the Ptolemaic and Copernican systems, for the figures he invoked were consistent with either. Rather it seems to have represented a tendency among some Elizabethans to search among the sciences for whatever could be found to bolster an already existing mood of pessimism. By this test any departure from the old accepted regularities, the perfectly proportioned system of the cosmos first established by God, must be for the worse. In Donne the mood became an addiction, and in Spenser it was frequent enough. But the latter could at least sometimes find cause for hope in science as in the Proem to Book II of *The Faerie Queene*. There Spenser pointed out that just as the Americas had lain unknown for long ages and then had been discovered so

[50]See the notes on these stanzas in *The Works of Edmund Spenser*, Variorum ed., by Greenlaw et al. (Baltimore, 1936), V, 154-61.

... later times things more unknowne shall show.
Why then should witlesse man so much misweene
That nothing is, but that which he hath seene?
What if within the Moones faire shining spheare
What if in every other starre unseene
Of other worldes he happily should heare?
He wonder would much more: yet such to some appeare. (Stanza 3)

The reference to a possible world in the moon, a consequence of the disintegration of the Aristotelian cosmology then beginning, was one of the earliest in English literature. And it is significant of the spirit of the new science that in this context Spenser voiced no theory of decay.

Raleigh was equally ready sometimes to favor and sometimes to discard the theory as suited his immediate purposes. At one point in his Preface to the *History* (1614) when he wished to prove that the world is not eternal he used all the familiar arguments, that the sun "doth not in these latter Ages assist Nature, as heretofore," that modern men cannot rival their forebears in stature and ability, that "all things in generall are reputed of less vertue which from the Heavens receive vertue."[51] At another point in the same Preface when struggling against the bondage of Aristotelianism he could write quite otherwise:

> But for myself, I shall never be perswaded, that GOD hath shut up all the light of Learning within the Lanthorn of *Aristotles* braines ... That God hath given invention but to the Heathen; and that they only invaded Nature, and found the strength and bottom thereof; the same nature having consumed all her store, and left nothing of price to after-ages.[52]

This latter was the Raleigh who for many years encouraged the mathematical research of Thomas Harriot.

Donne enlisted the theory of total decay in the service of elegy throughout his *First Anniversary* (1612). Fulke Greville in *A Treatie of Humane Learning* (ca. 1603) thought that human ignorance was growing more dense as the world declined from its

[51]Sig. E1v.
[52]Sig. D2v.

original wisdom but that man was able "if not to cure, yet to refine" this stupidity by turning knowledge to practical uses (Stanza 63). Here was a blend of Baconian utilitarianism with Greville's underlying skepticism. On the other hand, John Norden's poem *Vicissitudo Rerum* (1600), based on the historical interpretations of the Frenchman Le Roy, recited the usual cosmic evidence in order to demonstrate not decay but merely alteration, the periodic rise and fall of cultures among the various races of mankind (Stanzas 41-44 ff.). He held no brief for modern inferiority and drew no pessimistic conclusions. As J. B. Bury shows in his analysis of Le Roy,[53] this attitude was one foretaste of the theory of progress to be elaborated in the eighteenth century. But that it was by no means the only one is clear from what already has been, and will later be, said.

In the mind of the Elizabethan intellectual, then, the idea of decay entered easily into multifarious combinations with other ideas of despondency. It could be taken up or laid aside or contradicted or recast as the particular train of thought or mood dictated. We must not underestimate the complexity of human nature. My net impression, uttered with all tentiveness, is that decay was not one of the ruling ideas of the Elizabethan period; that it was shallow-rooted by comparison with such other pessimistic ideas as that of original sin, or the mutability of fortune, or the inflictions of God's Providence; that it was rather a rationalization than a cause of despondency. The aims of the intellectuals who employed it were usually moral and religious, their ammunition arguments from science. But these arguments were *non sequiturs* not acceptable to the great majority of Elizabethan scientists themselves.

One might, I think, read rather widely in Elizabethan scientific treatises without becoming aware from that source alone that there was any such idea in the period as the idea of continuing decay. Few discussed it explicitly. We have already quoted Bacon's stand upon the verse in Daniel 12 that in the last age of the world knowledge shall be increased. His whole program assumed the

[53]Pp. 44-49.

potency and improvability of the human mind. The anonymous author of the Paracelsan tract *Philiatros* (1615) relied on the same text in Daniel when defending the capacity of modern men to improve on Galenic medicine:

> And is Wit and Art in us dead, that wee can adde nothing: I beleeve otherwise. Not onely because in our owne Practise wee often finde a neerer way to the wood, but also, for that Daniel foretelleth how many in the last times running too and fro, should thereby multiply Science. And have we not dayly a taste of that trueth in all kinde of knowledge, by how much the more Navigation increaseth?[54]

All the proud statements of Hester, Barrough, Banister and others already noted pushing the limits of man's penetration into science infinitely outward imply that he has the vigor and acumen to reach after them.

But the chief weapon of science, as usual, was silence. The English astronomers as a group, Ptolemaic or Copernican, simply took no notice of the argument that the universe was running down. Recorde, the two Diggeses, Dee, Gilbert, and the rest marveled at the perfection of the order they were studying.[55] They broke out constantly into exclamations at the beauty of the heavens and their obedience to law. To have admitted that all this symmetry was already far gone towards chaos would have seemed a kind of sacrilege, for it represented the wonderful workmanship of God. Especially the Copernicans were unfolding a new vision of a more beautifully, more efficiently constructed universe which humbled and at the same time exalted them with religious awe.

It was the same in medicine and allied sciences.[56] Anatomists before as well as after Vesalius admired the present perfection of the human body. They had no thought that it was a ruined house for a ruined mind. When John Banister found that the body was not quite as Galen described it he concluded that it had changed since Galen's day but not changed for the worse.[57] Galenist phar-

[54]Fol. 12r.

[55]See below, the chapter "New Cosmos."

[56]See below, the chapter "God in Medicine."

[57]*The Historie of Man* (1578), sig. B2r.

macologists had faith in their herbs and uttered no word that these had diminished in medicinal power. The dozens of Elizabethan antidotaries made no such admission. And the Paracelsans, of course, had a belligerent belief in the virtues of their new chemical preparations. Any notion of flagging potency was quite foreign to this whole movement. Similarly, Moffat wrote on entomology, Gerard on herbs, Bourne, Hood, Wright, Norman on mathematics and navigation, each with a worshipful admiration of the natural laws which he was exploring. If they made reference to the achievements of the past it was to defend the right of the present to progress beyond it. And this right implied for them a power to do so, a trust that it was worth doing, and a faith in the divine excellence of that complex system of nature into which they were slowly finding their way. For so purposeful and joyous an optimism the idea of decay was meaningless.

Because of this new mood of affirmation and because its findings swept away the putative evidence for celestial decay, the new science played a major part in the dissipation of the whole theory of decay at the end of the seventeenth century and the beginning of the eighteenth. But many other forces, only a few of which we can mention here, were at work in the same direction, even during Elizabethan times. Political and social thinkers could look back to a tradition in Aeschylus, Euripides, Plato (the *Protagoras*), and other Greeks that mankind had risen to civilization from an earlier stage of savagery. A Christian adaptation of this idea was made, for instance, by Thomas Wilson in the preface to *The Arte of Rhetorike* (1567), wherein he traced the lapse of humanity into utter barbarism after Eden and then its restoration to culture through leaders gifted by God with reason and eloquence. Wilson did not envisage a continuing progress, but neither did he foresee future decadence, and he did dwell upon the ameliorative powers of human reason. Educators like Ascham, Cheke, and Vives did the same. Indeed the vast literature of Elizabethan humanism in those phases which glorified man's dignity and the imperial nature of his reason denied by implication that he was senile or approaching senility. And in France the political theories of Bodin led him

to the judgment that modern society was superior in knowledge to that of the ancients.[58]

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Within Elizabethan religion itself, moreover, we have seen that many forces worked powerfully for an optimistic view of man and nature. Whenever theologians extolled the vitality, scope, and fecundity of the human soul as marks of its immortality or as signs of its likeness to God, whenever they rhapsodized on the marvelous functioning of the cosmos as revealing the divine workmanship, and whenever they agreed that an approach to God, however partial, might be begun and sustained by a study of its wonders they were looking away from any theory of decadence. In such contexts the excellence of man and nature redounded to the glory of God. No hint was usually passed that such excellence could ever diminish or grow old.

Therefore if it was prophetic of the primacy of science in the battle against the theory of decay that the first Englishman to reject it explicitly and on the fullest possible scale was the scientist Francis Bacon, it was perhaps no less prophetic of the aid to be given by elements within religion that the second was George Hakewill, an Anglican divine. In *An Apologie of the Power and Providence of God* (1627), as faith required he reached the conclusion that the world would end, of course, but that the end would come through a single, instantaneous, supernatural stroke by the Creator, the works of nature meanwhile retaining all their pristine freshness and vigor. He was able to argue, moreover, that any other view of the matter was disadvantageous to religion:

> As the opinion of the *worlds universall decay quailes the hopes and blunts the edge of mens endevours*, so doth it likewise of our exhortations and threatnings, when men are perswaded that famines and pestilences, and unseasonable weather, and the like, are not scourges of God for sinne, but rather the diseases of wasted & decrepit Nature, not procured so much by the vices and wickednesse of men, as by the age and weakenesse of the world. And this opinion being once throughly rooted and setled in them, they neither care much for repentance, nor call upon God for grace. . . .[59]

[58]Bury, pp. 37-42.

[59]P. 19; also pp. 39-40.

Thus seventeenth-century religion was to break the long association between the two ideas of the world's end and the world's decay, preserving only the former which was to it far more fundamental. And the opinion of the thoughtful Christian layman was to become like that expressed in the *Religio Medici* (1642) by Sir Thomas Browne, physician and cosmopolitan of the intellectual world:

The Limits of Science

> I believe the World grows near its end, yet is neither old nor decayed, nor shall ever perish upon the ruines of its own Principles. As the work of Creation was above Nature, so its adversary, annihilation; without which the World hath not its end, but its mutation.[60]

But perhaps it was also prophetic that Browne, while retaining the idea of personal immortality, no longer believed in a Last Judgment.

Looking back over the ground we see that four possible deterrents to science arose in religion from conceptions of the bounds of human knowledge: limits of lawfulness, limits of penetration, limits of time, and limits of direction, focused respectively by the doctrines of curiosity, of undiscoverable principles, of the world's end, and of universal decay. For various reasons none of the four proved to be very grave. The Church's restraint in narrowing the prohibition against curiosity to any trespass upon the higher mysteries of the spirit, and in not pressing against investigations of the world of matter, was a key decision which no doubt saved Elizabethan scientists from any real persecution. But differences of view arose as to where lay the proper boundaries between matter and spirit, differences bitter in the case of judicial astrology, confused and vehement in the attempts to define black magic, and mildly desultory in the case of alchemy. Since, however, astrology was soon to be disowned by science and the whole concept of black magic abandoned by Christianity, and since alchemy, sloughing off its wilder occultism, was already visibly growing up into the respectable sciences of chemistry and pharmacology, this controversy was quickly to evaporate. The ulti-

[60]Ed. W. A. Greenhill (1881), p. 71.

mate effect on science was at least innocuous, perhaps beneficial. And religion was to emerge from it purified.

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The other three limitations, of undiscoverable principles, doom's imminence, and world's decay, were held with varying degrees of conviction and varying interpretations by some Elizabethan divines and neglected by many others. Moreover the first two were not susceptible of precise statement. Nobody could pretend to tell exactly where and when man's knowledge and the term of the universe must cease. Again, the contracting force of all these ideas was counterbalanced by expansive forces at least equally indigenous to religion. This is not to say that the various theories of limitation were not genuine depressants to the spirit of inquiry. They were. But among the clamor of diverse ideas the scientist could always find some to support his faith in the possibility of achievement, or he could shut his ears to the sound and fury and simply proceed with his work. One might sum it all up by saying that he had absorbing work to do, and religion did not decisively say him nay.

5

Providence, Natural Causation, and Miracle

I

THE CHRISTIAN doctrine of Providence was a blending of Hebrew conceptions of the universe as primarily a religious and moral order with Greek, especially Aristotelian, conceptions of it as primarily a physical order. To the Semitic peoples, absorbed in thoughts of God, the Greek philosophical idea of impersonal, implacable natural law had little meaning. Feeling themselves always in the immediate presence of a watchful Father, and knowing nature to be his instrument, Jews read in all its workings a personal directive of rebuke or reward for their own vice or virtue. In effect their piety or lack of it determined, they thought, what happened in nature. The natural order under the hand of God seemed infinitely flexible to their successive spiritual crises.

Much of Greek philosophy, on the other hand, exerted itself to discover how the universe worked in terms of physical law, and the less flexible in this sense the better. Even Plato, for all his ethical and religious genius, did not suggest that what happened in the order of nature depended in any way on fluctuations in the moral order. By and large, it did not occur to the Greek philosophers that the great sequences by which effect followed upon cause since the beginning of time could be periodically either deflected or broken from above for the edification of the creature called man.

The problem for Christian theologians was to combine these two elements of their intellectual and spiritual heritage by making the idea of the regularity of nature consistent with the idea that God was constantly using nature to admonish, chastise, and reward

men for behavior which was forever varying.[1] This they did in two ways. First, and most significantly, by emphasizing that God foresaw man's moral choices and so planned the order of nature from the first as to respond to them. So God foreknew what the sinfulness of the Elizabethans would be and arranged in advance for an earthquake in 1580, a plague in 1593, a flood in 1600, comets, droughts, storms, or crop failures in other years. These were the punitive measures normally used by God, acting through a preordained order of nature. But, in the second place, as a special evidence of his concern, God sometimes preferred to act outside the natural order, by miracle. The great new star in Cassiopeia in 1572, unexplainable on any natural grounds, was at the time generally admitted to be an example.[2]

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This solution of the problem of reconciling an order of nature with an order of God can be seen already fully worked out in Augustine and Boethius.[3] But in a new context it lies at the inmost heart of the relations between religion and science in the Elizabethan age. How it was tugged and pulled at, given this or that new slant or emphasis, passionately or perfunctorily accepted, subjected to neglect or replacement in varying degrees by different groups of thinkers is the story to be told in detail hereafter. Now we must be content to see in a general way how vital was the issue to all parties concerned.

The first requisite of science is that there be a regularity in the realm of natural events which can be observed, stated in the form of generalizations, and then used for understanding the causes of other events and the stating of other connected gener-

[1]Among the many Renaissance discussions of Providence see John Calvin, *Institutes* (1587), Bk. I, chap. 16; Peter Martyr Vermigli, *Common Places* (1583), Pt. I, chaps. 16-18; John Pelling, *A Sermon of the Providence of God* (1607), passim; William Perkins, *A Golden Chaine* (1600), chap. 6 ff.

[2]See below, the chapter "New Cosmos."

[3]Augustine, *The City of God*, tr. J. Healy (Edinburgh, 1909), Bk. V, chap. 8, pp. 153 ff.; Boethius, *The Consolation of Philosophy*, Bk. V. See also Aquinas, *Summa Theologica*, Pt. I, Qq. 22 ff. Christianity's contribution to the idea of an order of nature is brilliantly discussed by Alfred N. Whitehead, *Science and the Modern World* (New York, 1925), chap. 1. See also Christopher Dawson, *Progress and Religion* (London, 1936), pp. 125-27, 183-86.

alizations. The more irregularity, the less science. Science abhors chance, or its theological equivalent, the miracle, as nature abhors a vacuum. Hence that part of the doctrine of Providence which assumed a regular order of nature was most welcome to the Elizabethan natural philosopher. He tended to extend it as far as possible into what had previously been considered the domain of miracles, though seldom wishing to deny them altogether. As for God's manipulation of nature as a rod of correction to men, the scientist had no quarrel with it so long as it did not develop into a series of irregular, unpredictable, divine responses to individual human needs. We shall see, however, that it was constantly being interpreted in exactly that way by the average Elizabethan as well as by many theologians. Consequently it was an embarrassing factor which the scientist would have liked to minimize. This is not to say that most scientists of the period did not accept the doctrine among their personal articles of faith. Nor to say even that they reduced the conflict to any precise issue in their own minds. But in so far as they thought about the methods and purposes of science they were beginning to recognize the obstacle for what it was and to look for ways of getting around it.

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For Christianity a God who controlled nature was essential. A Deity without such control, an absentee God like that of the Epicureans, could not be an object of real worship or a source of help to men in their distress. Tied in at many points with this idea was another basic concept, that the world had been made by God explicitly for man. "For my wealth and comfort," said Thomas Becon typically in *A New Catechism*, "for my joy and solace, hath God my Father created heaven and earth, and whatsoever is contained in them."[4] As accepted virtually everywhere in Renaissance thought, this view did not mean merely that the physical environment on earth had been made suitable

[4] *Works of Thomas Becon: A New Catechism,* ed. John Ayre (1844), Parker Society, III, 19. Even Mephistophilis admits this in Marlowe's *Doctor Faustus,* Act II, Sc. 2. For discussion of the doctrine in Aquinas see A. O. Lovejoy, *The Great Chain of Being* (Cambridge, Mass., 1936), p. 77. Its medieval formularizations are noted by Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory* (Hanover, N. H., 1917), p. 18.

to man's needs. More, it meant that the entire cosmos had been designed and created by the Father solely as a theater for the drama of the human struggle for salvation. For this the stars rolled in their courses, the recurring sun warmed the fruitful earth, vegetation sprang, rivers flowed, angels did their errands, Satan was permitted to work apparent miracles, and Adam was given the lordship of the earth. Indeed, God made the cosmos fair in order that men, seeing this beauty, might be drawn to a consideration of its Maker.

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From this idea stemmed directly the belief that God could not be an indifferent spectator to the physical and spiritual struggles of men. On the contrary, he watched over them with the ceaseless care of a father. His Providence extended to the smallest accidents of life and to the slightest needs of his human children. It was unthinkable that he would not use the forces of nature as agents of his anger or approval. On the other hand, it was clear to observation that these forces normally moved in certain patterns. And a satisfactory idea of the omnipotence, immutability, and wisdom of God seemed to require that all his purposes should have been integrated from the beginning in a vast scheme operating through physical nature, the wills of men, and the wills of angels. Hence the religion both of the head and of the heart needed, and philosophy gladly provided, the concept of an organization of nature which, as we have seen, science also needed and welcomed.

But the religion of the heart had further demands not altogether consistent with the solution offered by this version of the doctrine of Providence. The latter called for an admission that every event which was to happen in the realm of physical nature down through the centuries had been prefixed by God at the beginning of the world. Included in this predetermination were all those phenomena like comets, plagues, tempests, floods, earthquakes, and so forth, which God used for the moral solicitation or physical punishment of men. And not only these, but their consequences. For if men, once warned, showed improvement, a plague would be taken away, a storm calmed, a drought alleviated by rain, whereas

if they persisted in sin more dire disasters would follow. Thus Providence meant that the outcome of each spiritual crisis had been divinely previsioned and its practical results geared into the order of nature.

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Now this was all very well for the satisfaction of those minds which delighted in contemplating the unity of the world. But it had a way of freezing the religious feelings of the average man in the time of his most grievous trouble. The problem centered in his experience of prayer, the inner light of all religion. In sickness, in worldly misfortune, in hunger, or in peril of his life at sea he uttered a cry for help and consolation from above. To think in such darkness that he was praying to a God who had settled the whole issue in advance was, often, to conclude that prayer was futile. Arthur Hildersam in his *CLII Lectures Upon Psalme LI* (1635), like many another preacher had to meet the argument of those who found it needless to pray,

> Because the good successe of all things depends upon, and is to be ascribed (not to prayer but) to second causes and meanes God useth to work by; and unto the reason, will, and endeavour of man. The Lord (say they) hath set a constant course in nature. . . .[5]

Such doubters might indeed be given the theological reply that God had foreseen, though not preordained, whether or not they would pray on any given occasion, had made up his mind before the Creation whether or not to grant the prayer, and had built the whole order of nature accordingly. But it did the man on his knees little good to be reminded that to God all past and future was one eternal present, that predestination was not the same thing as foreknowledge, and that there was a learned difference between absolute and conditional necessity. What he wanted was

[5]Arthur Hildersam, *CLII Lectures Upon Psalme LI* (1635), Lect. 13, esp. pp. 70-71. Also Henry Bullinger, *Decades*, ed. Thomas Harding (1849-52), Parker Society, X, Decade 5, Sermon 5, p. 167: "But because many do not only loathe holy assemblies, but also say that prayers are altogether superfluous, vain, and unprofitable; before we proceed any further we will shew that the godly must pray, and that the prayers of the faithful are both effectual, profitable, and necessary." When Christopher Marlowe "gibed at prayers," as Thomas Kyd reported, it was probably on some such argument as this.

an inner assurance that his cry could move God as of now. He had to think of God as undecided, and his prayer as affecting the decision in this moment of his need for deliverance.

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This urgency of human need brought strong pressure against the doctrine of natural order, less by any logical attack than by concessions it exacted from the clergy in the matter of emphasis and omission. It is fascinating to compare the stately edifice of cause and effect envisioned in the more abstruse theological treatises with what the clergyman actually preached when, ascending the pulpit, he ceased to be a metaphysician and logician and became instead a keeper of souls. Urging prayer and moral regeneration in the face of natural disaster, more likely than not his sermons said nothing whatever about preordination. Their clear implication was that God made up his mind what to do about human petitions at the moment of their uttering, not before time began. Henry Bullinger, for example, in the Fifth Sermon of his Fifth Decade, preached as if prayer could make God change decisions already made, citing from Scripture many cases of how "God changed his sentence that he had pronounced," and concluding, "Wherefore the prayers of the faithful are effectual, staying the wrathful judgments of God, yea, and taking them clean away."[6] William Perkins, John Dod, Thomas Becon, and a host of others encouraged their parishioners by the same means, as did also the official homilies of the Church of England.[7] The Suffrages of the Liturgical Services of the Anglican Church likewise included prayers "For rain, if the time require" and "For fair weather," for good crops, for the abatement of plagues, and the like, all without suggesting that God's responses would be anything but improvisations of the moment.[8]

[6]P. 168.

[7]*Certayne Sermons Appoynted by the Queenes Majestie* (1569), pp. 229, 232; William Perkins, *An Exposition upon the Lords Prayer* in *Works* (1605), p. 418; John Dod and R. Cleaver, *Ten Sermons* (1621), p. 132; Thomas Becon, *The Pathway unto Prayer* in *Early Works,* ed. John Ayre (1843), Parker Society, II, 141-44.

[8]*Liturgical Services of the Reign of Elizabeth,* ed. W. K. Clay (1847), Parker Society, XXX, 17.

As an alternative to this more usual method of simply failing to say anything about antecedent natural cause, the preacher might on occasion point out that God could always, if he wished, break the sequences of causation by miracle in answer to prayer. Thus the well-known divine Henry Smith not only said that prayer was "victorious and powerfull, that it overcometh God himselfe, which overcometh all things"; he went on to remind his audience that

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> . . . all the Prophets doe witnesse, that whatsoever wee aske in prayer, if wee beleeve, we shall receive it. . . . Hast thou not heard how the Sunne stood still in the firmament, and was not suffered to run his course? *Josua* and *Ezechias* prayed, & the Sunne stood still. Hast thou not heard of the stopping of the Lyons Mouthes? *Daniel* prayed, and his prayer stopped the Lyons greedy & devouring throates.[9]

This was, of course, an extreme form of stress on the immediate and intervening efficacy of prayer. Each suppliant could not lightly be promised a miracle in his own case. But by one method or another the minister had the duty of making his congregation see, really see, God's willingness to answer any suit from a humble and believing heart, and always as of the present moment. Therefore to the extent that prayer might ask for some event in nature, like good crops or good health, all Christian churches yielded ground in practice to what they discouraged in their theory of Providence: a belief that nature below the moon was not so much a system as a series of unconnected personal responses by God to human requests. The total effect of this side of Christian practice was certainly unfavorable to science. But its concrete results were mitigated by the further doctrine, preached by clergymen of all faiths, that whenever the thing prayed for was a physical event which the worshiper might himself help to bring about, he was expected by God to use all available means to that end. To stay merely idle was to tempt God. This was the important idea encouraging an appeal to science in life's practical affairs, notably in the emergencies of illness.[10]

[9] *Three Sermons* (1604), *The Sinfull Mans Search*, sig. E4v-5r. Also Hildersam, loc. cit., and the *Certayne Sermons*, loc. cit.

[10] See below, the chapter "God in Medicine."

II

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Having looked at the general meaning of the idea of Providence for both religion and science, we are now in a position to say something more specific about the roles attributed to chance, fate, and miracle. For the theologian as well as the scientist there could be no such thing as chance.[11] Every occurrence in the physical world was both a consequence of what had gone before and a cause of what came after. Or if not that, then it was a miracle, a new creation introduced without a prior natural cause, but producing thereafter effects of its own. The totality was a complex fabrication designed by the Creator in minutest detail from all eternity, and executed every moment according to plan. What looked like a chance event was really one whose place in the context of the whole was not visible to man's feeble insight.

So ran the theory of Providence. In all save the provision for miracles, to be discussed in a moment, it suited the scientist perfectly because it denied the existence of fortuitous comings and goings in the scheme of nature which would have rendered exact knowledge difficult or impossible. The doctrine likewise was indispensable to the theologian because admission of chance, by very definition outside God's control, would have derogated from the divine omnipotence. If much indulged, a belief in chance would expel God from nature, make him a figurehead, and finally dissipate faith in him altogether. Such had been the results of the philosophy of chance which underlay the atomism of Democritus, Epicurus, and Lucretius. Attacks on these ancient and dangerous examples were therefore a constant feature of Renaissance theological discussions of chance, such as those of Calvin and Beza.[12] And it was by way of reaction to this danger that they made their most unqualified statements of the inviolability of natural

[11]Aquinas, Pt. I, Q. 22, Art. 2; Boethius, loc. cit.; Calvin, fol. 56v; John Bradford, *A Treatise of Election and Free Will* in *Writings: Sermons and Meditations*, ed. Aubrey Townsend (1848-53), Parker Society, V, 212; Marcellus Palingenius, *Zodiake of Life*, tr. Barnabie Googe (1588), Bk. VIII, pp. 132-35.

[12]Calvin, ibid. and fols. 7r-8r; Theodore Beza, *Job Expounded* (1589?), sigs. B1r, C7r; Saluste Du Bartas, *Devine Weekes* (1605), Seventh Day of First Weeke, pp. 235 ff.

law under the government of God. Chance, atheism, atomism thus often became coupled in the Elizabethan mind. So in Sidney's *Arcadia* the attack by Cecropia upon Christian faith turned on the argument that the world had come into being by chance, and Pamela's answer on a denial of the theory of pre-existing atoms:

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> For this goodly worke of which we are, and in which we live, hath not his being by Chaunce . . . for Chaunce could never make all thinges of nothing: and if there were substaunces before, which by chaunce shoulde meete to make up this worke, thereon followes another bottomlesse pitt of absurdities. For then those substaunces must needes have bene from ever, and so eternall: and that eternall causes should bring forth chaunceable effects, is as sensible, as that the Sunne should be the author of darkenesse.[13]

Science would probably have been the gainer had not this theological stigma attached, quite unnecessarily, to the atomic hypothesis. In all other respects, however, scientists and theologians could join in condemning the idea of chance.

But anyone who has studied the ways in which the average Elizabethan layman actually lived, spoke, and felt knows that he had by no means abandoned a kind of semi-belief in chance, or in fortune, a personification of chance. In the Elizabethan drama, for instance, people appealed to chance, fate, fortune, or the stars at least as often as to Providence. These formed a pantheon of minor deities whose power over human life still seemed mysterious and possible. To the theologian on his eminence the concatenation of all events under the finger of God might be clear, but to the non-clerical eye the affairs of nature and of man often looked sadly haphazard. True, the common man's piety when he thought over a particular happening might raise him to repose his final trust in the over-arching rule of God. But often he did not think the matter over, resting instead on his immediate reaction, which might jumble together unformed elements from half a dozen different kinds of interpretation under a dominating sense of mystery. An eclectic by nature, he preserved a feeling for the true complexity of things far greater than that of the

[13] 1590 version, ed. Albert Feuillerat (Cambridge, 1922), pp. 407-408.

theologian or the natural philosopher who tried to reduce the universe to a system.

If chance was not recognized by theology, neither, at the other extreme, was fate, at least in the Stoic meaning of an impersonal and inexorable nexus of events.[14] The world in Christian eyes was not a mechanism which continued working of itself once it had been launched into activity by God. It did not resemble a clock which God winds up only once or a house which the divine carpenter leaves when he has finished it.[15] Such mechanistic views seemed, no less than the contrasting theory of chance, to banish God from the world of his creation and diminish him as an object of worship to human beings who had to live in the flux of events.[16] Here comes up again the problem of prayer. In the Stoic fatalism of the past the Christian divine could see that the result had been to substitute fate for God. When confronted, as he often was in judicial astrology, with any very rigid doctrine of the causal nexus he consequently reacted in the other direction, dwelling upon God's unimpeachable power to guide and intervene. Thus for example Calvin's emphasis in his discussion of Epicurean chance was quite the opposite of what it was in his discussion of Stoic fatalism.[17] Facing the former he stressed the order of natural things; facing the latter, the personal quality of God's ordering, hence often the irregularities of nature designed to display the divine anger or pleasure.

But what was most mandatory on all churchmen under all conditions was to insist that the vast trains of cause and effect running through the universe could not continue to operate for a moment unless sustained by the infused vital power of Deity.

[14]Aquinas, Pt. I, Q. 116; Augustine, loc. cit.; Calvin, fol. 59v; Bradford, loc. cit.

[15]Lambert Daneau, *The Wonderfull Woorkmanship of the World* (1578), fol. 12v.

[16]It was a perennial complaint of the Paracelsans that the Aristotelian-Galenic world was too mechanistic. See Joseph Du Chesne, *The Practise of Chymicall and Hermeticall Physicke* (1605), sig. C2r; and R. B., *The Difference betwene the Auncient Phisicke and the Latter Phisicke* (1585), the "Obtestation to almightie God."

[17]Calvin, loc. cit.; Beza, sigs. B1r, F8r & v. Du Bartas, Fourth Day of First Weeke, p. 132.

God governed things, said William Perkins in *An Exposition of the Creede* (1595),

First by *sustaining* and preserving them that they decay not: secondly by *mooving* them that they may attaine to the particular endes for which they were severally ordained. For the qualities and vertues which were placed in the Sunne, Moone, starres, trees, plants, seedes, &c. would lie dead in them and be unprofitable, unles they were not onely preserved, but also stirred up and quickned by the power of God as oft as he imploies them to any use.[18]

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So far as the natural philosopher was concerned, this *concursus*, as theologians called it, made no difference one way or the other. It did not introduce any new irregularity into nature but merely assigned a religious cause to the admitted regularity already existing. And the same was true of the idea of God as Creator. Only in the question of miracles, which interrupted the order of nature, would the scientist—in his role as scientist, though not as Christian—have preferred a strict physical necessitarianism to the doctrine of a personal Providence.

Neither did the free-will controversy affect science. For one thing, freedom of the human will was discussed by theologians almost always in connection with the question whether man had any share in winning his own salvation, a question which did not concern the investigation of nature. The only pertinent fact was that man's choices, whether made in freedom or in servitude, had all been foreseen by God and faultlessly geared into the moving complex of the world's order. There they produced still other consequences and choices whose outcome had been foreseen. These produced still others, and so on, until the whole magnificent structure of cause and effect had served its purpose as a proving ground of man's soul and had been dissolved in conflagration at the Last Judgment. God thus used the human will, slave or free, as one means of executing his Providence. The concept of a natural order built around this will remained inviolate, and science was not affected. Of his own liberty of will to examine this natural order the scientist never doubted.

[18]In *Works* (1605), p. 174.

III

Most disturbing to science were the implications of the doctrine of miracles. According to Peter Martyr Vermigli, whose *Common Places* (1583) was one of the books of theology most in vogue among Elizabethans,

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> A miracle is a worke hard and not usuall, doone by the power of God, above the power of anie creature; and wrought, to the end it may cause the beholders to woonder, and to confirme faith towards the word of God.... I thinke it best to adde, that that power of God, which goeth wholie beyond the power and strength of nature, must sometime be understood of Gods owne working; and sometime of that which he dooth by angels, or by men....[19]

That is, although the ultimate power for a miracle comes always from God, he may sometimes choose to give it effect through angels or through men. The English clergy were disposed to deny, however, that "nowadays" God ever did such works through men. Others tried to distinguish different species of miracles, depending on whether God performed them without nature, above nature, or against nature. These are minor technicalities. The essential point about a miracle, as Aquinas had long since said, was that it was "done outside the order of nature,"[20] that it was not the result of a natural coherence of causes but a new act by the Almighty, a new creation suddenly interposed into the order of nature. And its aim was always to aid in redeeming men by confirming their faith in God.

But why should the Father resort to miracles when he already can and does so bend the forces of nature as to give abundant schooling to the human race? The answer is that our weakness or obstinacy on occasion requires an extraordinary assertion of the divine might. Sir Thomas Browne gives the standard explanation in *Religio Medici*:

> Now this course of Nature GOD seldome alters or perverts, but, like an excellent Artist, hath so contrived His work, that with the

[19]Chap. 9, p. 63; Aquinas, Pt. I, Q. 105; Du Bartas, Second Day of First Weeke, p. 59; John Darrell, *A Survey of Certaine Dialogical Discourses* (1602), pp. 68-69.

[20]Aquinas, Pt. I, Q. 110, Art. 4.

self same instrument, without a new creation, He may effect His obscurest designs. . . . Yet this rule of His He doth sometimes pervert, to acquaint the World with His Prerogative, lest the arrogancy of our reason should question His power, and conclude He could not.[21]

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But it did not follow that in thus acting outside the bounds of natural law God was altering his pre-established scheme of Providence. The miracle itself was an integral part of this scheme. God had foreseen that at this particular moment in time man would need a surpassing act of wonder, just as he had foreseen that at other particular moments the sending or withdrawing of a plague or the evolutions of weather by exclusively natural means would suffice. From both instances, the miracle or the naturally caused phenomenon, consequences would flow which would take their assigned place in the subsequent history of nature. So if men sufficiently reformed themselves after affliction by miracle or by natural disaster, God might avert further consequences by another miracle or by using the appropriate natural forces, this liberation likewise having been foreseen and provided for in aeons past.

The trouble with miracles from the viewpoint of science was that they broke the order of nature. They were irregular. They were unpredictable. Moreover, there was a great temptation among laity and clergy alike to call every unexplained natural phenomenon a miracle. This in itself was a type of explanation which reacted against any attempt to explain the phenomenon in terms of natural cause and effect. Anyone who made such an attempt might be branded an atheist because it was felt that he was depreciating the majesty of God. Worse still, even catastrophes whose natural causes were perfectly well known might by popular terror be drawn into the class of miracles about which nothing could be done. The great plagues which ravaged England at the close of the sixteenth century were examples in point. Some sections of the population, believing that God's wrath was afflicting them without natural means, refused to observe the official

[21]Ed. W. A. Greenhill (1881), p. 28; also pp. 34, 46.

quarantine regulations, as will appear in a later chapter.[22] In these and other ways the belief in miracles tended to lessen incentives to intellectual and practical activity. As before, I do not wish to suggest that all scientists in a body drew away from the idea of miracles. But it becomes important to see more closely what types of occurrences they and other Elizabethans were willing to accept as miracles, and how frequently.

Among those miracles which almost everybody—at least the great majority who were Christians—acknowledged without question were those vouched for by Scripture, as well as those which had taken place in the early centuries after the death of Christ. The standing still of the sun at the prayer of Joshua, the parting of the Red Sea, the manna in the wilderness, Christ's healing of the leper and raising of Lazarus from the dead—all had been done for the establishing of the Christian religion, and only an atheist would reject them. Scientists had no wish to put themselves in that class, especially over prodigies which were now safely in the past. For their part, when churchmen discussed miracles, they preferred to draw their examples from this scriptural kind. Who could be sure that this or that contemporary wonder was truly a miracle? Usually it was better to say generally that God governed the world sometimes through nature, sometimes through miracle, and then cite the well-authenticated instances from the Bible, than to bring the topic into the modern world. So, typically, when Thomas Playfere took up the problem in his *Nine Sermons* (1612) he never came down a day later than the miracles of the Saviour.[23] A vague contemporary application like John Pelling's statement in *A Sermon of Providence* (1607) that miracles can happen

> In tempests at sea many times, when men looke every houre to be cast away; In extremetie of sicknesse, when Physitions and all give a man off; In dangerous childbirths, when women be at their wits end . . .[24]

is as much as one usually finds.

[22] "God in Medicine."
[23] Pp. 20-27.
[24] P. 10.

A further reason for the flight from modernity was that English Protestantism was engaged in a campaign against the present-day miracles claimed by Catholicism in the lives of its saints, cures at its shrines, and the like. In pursuit of this challenge such books as Fernando Texeda's *Miracles Unmasked* (1625) went far towards the position that there were no miracles nowadays. Abundant among Anglicans and Puritans alike were assertions like this one in John Downame's *The Summe of Sacred Divinitie* (1630?):

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> Wherefore Miracles (wherewith it pleased God to grace the extraordinarie Ministeries of the Prophets and Apostles, are long since ceased, neither could they nowadayes serve to any use, the truth being long agoe aboundantly confirmed by Christ and his Apostles.[25]

This, however, appeared in an anti-Catholic context, and was the kind of overstatement that might be expected in the heat of controversy. In many such cases when Protestant clergymen said outright that miracles were over they really meant only that Catholic miracles were fraudulent or, at most, that the working of miracles by God through the agency of men had ceased.[26] Similarly, quarrels over the powers of witches and the possibility of exorcism produced, from the more skeptical writers, many categorical assertions that "miracles are ceased." Reginald Scot said so without making any exceptions. But he and his fellow controversialists were busy arguing a case and can scarcely be taken as denying that God himself still performed miracles.[27] Fundamentally, Christianity guarded the theory that modern miracles still occurred by direct action of Deity. God could not be supposed to have tied himself exclusively to the use of second causes.

[25]P. 377.

[26]See Edward Dering, *Workes* (1590), pp. 114-17; John Jewel, *Upon the First Epistle to the Thessalonians* in *Works*, ed. John Ayre (1845-50), Parker Society, XXIV, 922-23; Hildersam, loc. cit. For the Catholic view read Richard Bristow, *A Briefe Treatise* (Antwerp, 1599), fol. 19r ff.

[27]Reginald Scot, *The Discoverie of Witchcraft* (1584), Bk. VIII, chap. 1, p. 156; James Mason, *The Anatomie of Sorcerie* (1612), pp. 7-8; King James I, *Daemonologie* (1597), pp. 22, 66; Samuel Harsnet, *A Discovery of the Fraudulent Practises of John Darrel* (1599), the Epistle to the Reader.

But how often was God likely to act without second causes nowadays? The usual statement from the theologians was that he did so "sometimes," as in Perkins' *An Exposition of the Creede* (1595):

> Sometimes God worketh without meanes . . . sometimes hee governes according to the usuall course and order of nature, as when he preserves our lives by meat and drinke: yet so, as hee can and doth most freely order all things by meanes either above nature or against nature, as it shall seeme good unto him. As when hee caused the sunne to stand in the firmament. . . . [Jos. 10. Isa. 38.][28]

Here and there crop up a few rather random preferences for "often" or "many times," as in the quotation from Pelling above. Even the most mystical divine did not contend that God usually worked otherwise than through the normal course of nature. A miracle, by very definition, had to be extraordinary. Nevertheless, a preacher was on the whole more likely to see miracles around him than was a natural philosopher. The latter, accustomed to dealing with natural laws, inclined to recognize their presence in unusual phenomena even though he might not be able to explain exactly how a given case came about.

This tugging in opposite directions stands out clearly in the general dicta of both groups. Writing of the formation of comets Fredericus Nausea in *A Treatise of Blazing Starres* (1618) described the clerical propensity to call them miracles:

> The Religious Divines, like very well of this plausible and true opinion, that Blazing starres come of no other cause, then from the holy Counsell and Providence of God; that there is no matter of their generation, as Phylosophers imagine, but that God maketh them immediate messengers and Ministers of his will, according to the time and place, as it best pleaseth his hie and eternall Majestie: (that by them) he might give us advertisements of afterclaps. . . .[29]

By contrast Walter Bailey, whose *A Briefe Discours of Certain Bathes* (1587) rebuked the credulity of those who found miraculous properties in mineral springs, represented the advance guard of natural philosophy:

[28]P. 174.

[29]Tr. Abraham Fleming (1618), sig. B3v.

For as it may be accounted meere impietie to detract any thing from the omnipotent power of God, to thinke his hand so shortened, that he is not aswell able to produce things miraculously now in these our daies, without the mean of naturall causes, as he did often in times past: so without derogation of Gods power I trust, we may affirme, that in these our latter daies, God for the most part doth in his actions put natural meanes as instruments, of which the Philosophers do consider as naturall and inferior causes. For if we shall say that God without any naturall course, supernaturally doth produce all things, we shall subvert all the grounds of Philosophy and spoile nature of all actions. Rather in mine opinion we are to imbrace that saying in Genesis, that God doth cease from newe creation of things, having given to them a nature and power, by the which they stande and fall.[30]

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One feels here that only a residuary piety kept Bailey from saying what he really wanted to say, that there are no miracles at all "in these our latter daies," or not enough of them to make any practical difference.

The urge was the same in the medical text, *The Suffocation of the Mother* (1603), by the physician Edward Jorden:

I doe not deny but that God doth in these dayes worke extraordinarily, for the deliverance of his children, and for other endes best knowne unto himselfe. . . . But such examples being verie rare nowadayes, I would in the feare of God advise men to be very circumspect. . . .[31]

Jorden's practical thesis was that almost all cases of supposed demonic possession of the human body were really cases of mental illness. In fact, he did not cite a single actual instance of what he considered genuine supernatural entry. Sir Thomas Browne also, while declaring a belief in miracles, was very wary about admitting any contemporary cases. And it will be remembered

[30]P. 5. Read also the mathematician William Bourne, *The Treasure for Traveilers* (1578), Bk. V, chap. 1, fol. 4v, discussing the natural causes of the erosion of seacoasts: "And although there bee nothing that happeneth, but the providence of almightye God, dooth bring it to passe: yet notwithstanding it hath a naturall cause why it is so, although it seemeth supernaturall or unpossible for that God dooth woorke all thinges by a meanes, and yet doth come to passe by some naturall cause."

[31]Sig. A3r.

that Bacon favored investigating supposed miracles and reducing them "under some Form or fixed Law; so that all the irregularity or singularity shall be found to depend on some common Form,"[32] a process which in effect brings miracles within the order of nature and explodes their miraculous quality.

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These men had reached a more conscious stage of rationalism in this one regard than many others in their field had yet attained, but the current was setting in that direction. They spoke what others were beginning dimly to perceive. Very different was the case with the general Elizabethan populace, who, whenever something spectacular happened in nature, were readier to call it a miracle than was either the natural philosopher or the intelligent theologian, especially if it had a strong bearing on their own lives. A man's disposition to find miracles everywhere was in proportion to his ignorance of their causes.

We can see this very clearly in the pamphlets issued in droves for popular reading immediately after each such event. A new mineral spring bubbled out of the ground in Cheshire, and G. W. wrote that its water had been given by God, "the overruler of naturall causes," a miraculous virtue to heal disease.[33] Floods ravaged Coventry, and *Miracle upon Miracle* (1607) anonymously warned that only an unbeliever would search for their natural causes. Lightning struck the church tower at Blechlingly, and Simon Harward, minister, explained that some lightnings were miraculous, some not, but all came directly or indirectly from the armory of God.[34] A woman developed a mysterious horny growth on her forehead, increasing faster than surgery could cut it off, and clearly God was departing from nature to brand her for cuckolding her husband.[35] Any birth of Siamese twins or other

[32]*Novum Organum*, ed. Spedding, et al. (1857-59), Bk. II, Aph. 28. But Bacon (see pp. 245, 296) accepted Biblical miracles and pictured one in his *New Atlantis* which brought the Christian Scriptures to the inhabitants of his scientific paradise.

[33]G. W., *Newes out of Cheshire* (1600).

[34]Simon Harward, *A Discourse of Lightnings* (1607). See also Bishop James Pilkington, *The Burnynge of Paule's Church in 1561* (1563), with subsequent Protestant-Catholic disputes on the same subject.

[35]*A Myraculous Discourse, of a Woman* (1588).

so-called "monsters" was similarly likely to be heralded as God's changing of natural law to rebuke sinners.[36]

An excellent test case for these various attitudes, popular, theological, and scientific, was the earthquake which shook all Britain on the afternoon of April 6, 1580. Though merely a minor shock, it was the only earth tremor of general incidence in Elizabethan times and caused much popular furor, calling out a whole spate of pamphlets claiming to tell exactly what had happened and why.[37] Among those which I have seen there is not one which attributed the quake to physical causes only. They were unanimous in agreeing that God had sent it as an omen of future disasters if mankind did not turn away from sin. The sole point left for discussion was whether God had availed himself of purely natural forces to generate the tremor or had created it outside the order of nature by miracle. A typically clerical bias showed up in *A Bright Burning Beacon* (1580) by Abraham Fleming, minister. Not only did he judge the quake definitely a miracle, but he took occasion to issue a general warning against the dangers of scientific explanations of God's wonders:

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Notwithstanding these reasons carrie with them a countenance & shew of credite, and therefore may the lesse be gainsaid: yet least by seeking to become too wise in the secret workes of God, and referring that to the course of naturall causes, which come to passe by the providence of his judgement, we fall into securitie, from securitie into incredulitie, from incredulitie into atheisme, from atheisme into open blasphemie: my counsell and advise is, that our eares tickle not to hear every vaine Philosophers fansie descanting upon matters of great importance, and therby pull from God the cause of his justly

[36] *Straunge Newes out of Kent* (1609) and *More Strange Newes: of Wonderful Accidents Hapning in Sommer Set shire* (n. d.). Other examples: Michael Scott, *The Philosophers Banquet* (1614), p. 217 (the blood of a murdered man flowing in the presence of his murderer); *Strange Wonders* (a meteor sent by God as a portent, possibly without natural means); Thomas Day, *Wonderfull Straunge Sightes* (1583?), (atmospheric effects over London construed as miracles). And see Thomas Hill, *A Contemplation of Mysteries* (1571), and William Fulke, *A Goodly Gallerye* (1563), passim.

[37] Abraham Fleming, *A Bright Burning Beacon* (1580), sig. A4v, lists nine such pamphlets, of which I have seen seven, those by Fleming, Golding, Twyne, Tarleton, Churchyard, Phillippes, and Shakelton, the other two seeming to be non-extant or unidentifiable.

conceived indignation against the wickedness of the world, and made apparant before hand by signes and wonders, lest any living soule should find fault with his too severe proceeding in judgement.[38]

Yet Fleming did not disdain to expound also the Aristotelian seismology and implied that it held good in most cases. But not in this particular case.

More interesting still was Arthur Golding's *A Discourse upon the Earthquake* (1580). Under a different title, *A Godly Admonition for the Time Present*, this pamphlet was attached to the official Order of Prayer issued for the Anglican Church by the Privy Council "to avert and turne Gods wrath from us, threatned by the late terrible earthquake."[39] Golding's treatise, said the Council, "may be read instead of some part of the Homily, where there is no sermon." Now the treatise was dedicated to proving that the earthquake was a true miracle:

> And although there be peradventure some, which . . . will not stick to deface the apparent working of God, by ascribing this miracle to some ordinary causes in Nature: Yet notwithstanding, to the godly and well disposed, which look advisedly into the matter . . . it must needs appear to be the very finger of God, and as a messenger of the miseries due to such deserts.[40]

Golding next argued that it was not due to natural winds within the earth according to Aristotelian theory. Yet he could not help adding the final cautionary word that even if some secret natural cause were at work, "whereof notwithstanding there is not any sufficient likelihood," men must never forget that the secret cause was itself wielded by God. Thus the Privy Council took for the Anglican Church the official position that the quake was genuinely miraculous.

By contrast, Thomas Twyne, member of the College of Physi-

[38]Chap. 2, sigs. B4r & v; also E2r, F2v, G1v. John Phillips, *The Wonderfull Worke of God* (1581), sigs. A7r, B1r, was less explicit but adopted the same general tone. *Gods Handy-worke in Wonders* (1615), sig. C2r, interpreted the Swiss earthquake of 1615 as supernatural.

[39]*Liturgical Services of the Reign of Elizabeth*, pp. 464, 564-67.

[40]P. 570.

cians, stated the case for science. Although conceding again and again that the finger of God was behind the tremor, he did not, in *A Shorte Discourse of All Earthquakes in Generall* (1580), think it miraculously unlinked to prior physical causes. And he added a marginal note which summed up nicely the shift of emphasis between himself and Golding: "God worketh evermore by second causes unlesse hee worke myracles which are against the common course of nature."[41] In that narrow word "unless" lies the whole breadth of separation between the sixteenth century religious and scientific points of view upon miracles.

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It was left, nevertheless, for Gabriel Harvey, the Cambridge scholar, to give the most rational account of the 1580 quake in one of his letters to Spenser. Like every other writer on the subject he began by admitting that it was sent by God as a token of wrath, with a purpose ultimately moral. Harvey then added quite soundly that he did not see how anybody on earth could tell indubitably whether God used natural or supernatural causation in bringing about any particular quake. For his own part, he inclined strongly to believe in natural causation in virtually all instances. What need for miracles? God had everything in the cosmos under his complete control and could direct it to

> put in execution such Effectes, either ordinarie or extraordinarie, as shall seem most requisite to his eternall Providence: and now in these latter dayes, very seldome, or in manner never worketh any thing so myraculously and extraordinarily, but it may sensibly appeare, he useth the service and Ministerie of his Creatures, in the atcheeving thereof.[42]

Harvey came as close here to saying "never" as it was possible for a Christian of the era to come. In common with many scientists who held it explicitly or implicitly (usually no more than implicitly), he was voicing one of those great directional ideas which steer the general course of science. The entire earthquake episode points up clearly the differences in emphasis between the stand

[41]Sig. A3v; also A1r, B3v.

[42]Letters to Spenser in *Works*, ed. A. B. Grosart (1884), I, 54-55.

of the Church and that of the typical scientist towards the doctrine of miracles.

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Though more subtly and less directly, scientific explanation of physical events in terms of natural cause and effect was also beginning to undermine the doctrine that God had prearranged those events to warn, punish, or command human beings for specific acts of virtue or vice. This development can be seen quietly under way in much of the contemporary literature of science. Its method was neglect, understatement, omission. The writer on medicine or astronomy who described the phenomena of his subject with only passing mention, or no mention, of their sensitiveness to man's moral behavior, was wittingly or unwittingly contributing to this cause. Hard it is to say how much of this relative neglect was due simply to the writer's preoccupation with the technical aspects of his subject, into which religion could not well enter, how much to conscious conviction that the physical explanations offered in the book were wholly sufficient. Certainly there was enough such neglect to provoke condemnation by many clergymen who felt that the scientific writers were in danger of becoming atheists by too exclusive attention to second causes. This was no new charge, and it was in large part unmerited. Few of the students of nature were actually forgetting God, but an increasing gap was forming between their studies and their religion. Their work influenced them to become less anthropocentric, more sure that when God acted through nature he did so in an impersonal rather than a highly personalized manner. The details of these developments, however, must be left to later chapters on the individual sciences.

IV

In summary it is perhaps well to stress again that the only real clash between religious and scientific ideas of causation was upon the question of miracles. So long as the order of nature remained unbreached, so long as there was no miracle, the scientist, *qua* scientist, could accept, though he could equally well do without,

the doctrine that God used nature for the moral schooling of mankind. Even with regard to miracles it would be all too easy to exaggerate the intensity of the clash. The area of agreement among all parties – theologian, scientist, and layman – as to the proper limits of the miraculous was wider than the area of disagreement. All agreed on the vast field of everyday incidents which were obviously not miracles. They agreed on certain specific miracles like those of Scripture and the supernova of 1572. Moreover, they agreed that others might still occur according to the unsearchable judgment of God. The tendency was to restrict new miracles to major spectacular instances in comets, tempests, earthquakes, floods, and the like, a limited field and rather out of reach for practical science, anyway. Natural causation ruled the much larger kingdom of the ordinary.

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Yet the possibility of miracles lurked as a psychological hazard in every field of scientific work and was at its worst when the phenomena were most new and therefore often most necessary for progress. The doctrine's adverse effects are very hard to assess in any concrete terms, but at least, in view of the great achievements of Elizabethan science, they were not catastrophic and probably in fact did little to stifle the spirit of inquiry. For example, the astronomers who began by viewing the nova of 1572 and comets above the moon as miracles ended by assimilating them to a new order of nature. Not science but the doctrine of miracles was eventually to suffer most from the opposition between them.

If the views of theologian and scientist on the whole question of the relation of the world of nature to God were not so far apart as they might have been, one reason was that science had not yet become a profession sharply distinguished from other professions. In Elizabethan society it was virtually impossible for a man to earn his livelihood as a scientist unless he went into medicine (like Thomas Hood), or lectured on science at the universities (like John Bainbridge), or at Gresham College (like Edward Brerewood), or acquired a wealthy patron (like Thomas Harriot), or became a vendor of instruments for navigation, surveying, and so forth (like Robert Norman).

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Much of the thinking and writing about science was done by men who were not exclusively students of science but gentlemen of independent income who looked on science as a hobby, or by scholars with wide general interests, or by temporary recruits from the other professions of law and theology. Especially remarkable was the large proportion of clergymen who gave their spare time to scientific studies and publication. To get some rough indication of their numbers I once compiled from the various branches of science an incomplete list of fifty-five Elizabethan writers on scientific subjects and discovered that twenty-four, or slightly more than two-fifths, were members of the clergy. The greater scientists of the age, the Diggeses, Gilberts, Harriots, did not, to be sure, fall within this clerical group. But many even of the professional scientists in medicine, mathematics, astronomy, and navigation first and last had received a good deal of religious instruction and had, most of them, gone through much the same university curriculum as the theologians. Consequently, the Elizabethan natural philosopher had not suffered to any dangerous degree the alienation of specialization. He could better be described as merely man thinking about nature—man capable of assuming other postures. This was a fact of the most basic importance.

For the purposes of our study, the Elizabethan laymen who were neither theologians nor students of nature fall into two groups: the general public and the intellectuals. Despite a growing interest in the classics and fields of secular learning generally, the public were mainly, in their ideas, satellites of the preachers whose sermons they heard on Sundays and whose books formed the staple of their reading. Yet, as often happens, the pupil decisively affected the teachings of his master. The only kind of God who meant anything to the common man was a spontaneous human-hearted God, free on the moment to condemn or to save, one not obscurely bound in far-off chains of causation. These being the personal hungers of his parishioners, the preacher's chief concern was to hammer home to them the idea of a moral government of the universe, without too debilitating a stress on a preordained

scheme, on a strict order of cause and effect. By so shaping the theology of the times, the masses were a great central reservoir of resistance to an exact scientific conception of natural law. Nor could the scientists themselves, living among such ideas, altogether escape their contagion.

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The other group, the intellectuals, consisted of the university men and the self-educated not engaged in scientific or theological pursuits. Here were the courtiers, the country gentlemen, the scholars, dramatists, and literary figures of the age. Here were the Spensers, Raleighs, Marlowes, Jonsons, Donnes, and here, too, was Francis Bacon. Their debt to theology was something less than bondage. In addition they were the legatees of humanistic learning, classical and contemporary. Notably, their range of variation was greater than that in any of the other groups. Many were eclectics. Elements from the pagan philosophies of ancient Greece and Rome combined with Christianity, Neo-Platonism, newer ideas from Renaissance thinkers of the Continent, in multiform amalgams. But on the point which concerns us, the prevalence of natural law, their heritage of philosophy tended to align them with the scientists, indeed even to place them beyond the scientists in their skepticism of the miraculous.[43] Furthermore, it is from this group that there comes the strongest temptation to challenge the religio-ethical interpretation that the universe is modulated by God for man's instruction and salvation. What we hear from them is not so much a forthright attack as a sapping and mining. Along with the scientists, the tentatively free-thinking intellectuals were true precursors of the revolution to come.

With this revolution, this shift in the whole concept of the

[43]The extreme form of the movement to explain away even Biblical miracles on natural grounds is exemplified in the notorious *De Tribus Impostoribus*, discussed by G. T. Buckley, *Atheism in the English Renaissance* (Chicago, 1932), p. 132. On the general subject see Ernest Strathmann, *Sir Walter Ralegh* (New York, 1951), chap. 6. For Marlowe's opinions see the report by Richard Baines analyzed by Paul H. Kocher, *Christopher Marlowe* (Chapel Hill, 1946). This movement probably owed a good deal to the growing scientific skepticism of contemporary miracles, being in fact a projection of it into the past. For the influence of Italian philosophy on this movement see E. Renan, *Averroes et L'Averroisme* (Paris, n. d.), pp. 357-58.

right relationship between natural and supernatural cause, especially in the fields of demonology, cosmology, astrology, medicine, and psychology where the interplay between religion and science was closest, the chapters ahead are concerned. We may turn first to that phase of the new movement which was beginning to ask whether the physical and psychic phenomena usually assigned to the activities of devils should not rather be traced to causes exclusively natural.

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6

Satan Exiled

HUMAN IMAGINATION, playing endlessly about the question whether there were spirits intermediate between God and man, produced during the centuries both before and after the start of the Christian era a wild profusion of such beings. Socrates had his daemon. Aristotle endowed the heavenly bodies with life and called them gods. The Neo-Platonists peopled with multitudinous orders of creatures airy and semi-divine the ethereal regions above the moon. In this latter tradition the works of such early writers as Iamblichus, Porphyry, and Proclus, followed by Psellus' eleventh-century *De Operatione Daemonum* and Ficino's fifteenth-century commentary upon it, came to Renaissance fruition in Marcellus Palingenius' well-loved poem, *The Zodiake of Life* (tr. 1588). Here were pictured in every supralunar orb and star deathless beings with bodies fine enough to pass through the diamantine hardness of those realms. The immense variety and immense chaos of all this lore found no better summary in England than in Robert Burton's "Digression of Spirits," contained in the First Partition of *The Anatomy of Melancholy* (1621). Whether such inhabitants of the upper skies were corporeal or incorporeal, mortal or immortal, whether they had any communion with men, what was the extent of their power, what their relationship with God—on questions of this sort there was the widest diversity of opinion.

Orthodox Christianity tried from the first to reduce this confusion to order by applying strictly to all spiritual beings the test of good and evil.[1] There could be, from this point of view, only

[1]Augustine, *The City of God*, tr. J. Healy (Edinburgh, 1909), Bk. VIII, chaps. 14 ff., and Bk. X.

two kinds of unbodied spirits: angels and devils, both agents of God but the former willingly and the latter unwillingly so. According to some medieval scholastics, an angel guided each rotating cosmic orb, but, generally speaking, theologians agreed that angels resided in heaven and were used by God as messengers doing God's errands to earth.[2] All spirits who were not angels siding with God must be devils siding against him and were confined, since their fall from heaven with Lucifer, to the elemental regions below the moon—"within the bowels of these elements," as reported by Marlowe's Mephistophilis. There they sought to work evil upon men, only in the end to bring forth a good never intended. Like angels, like men, like all the inanimate forces of nature, demons were actors in the great scheme of God's Providence.[3] Their every movement had long been foreseen by God and incorporated into the whole.

This Christian denial that there existed any ambiguous or neutral spirits between the two groups was to cause tragedy to John Dee and others of the Neo-Platonic persuasion who wished to explore nature with aid supernatural yet not demonic.[4] A vague area persisted within which the two conceptions clashed—within which, if men desired to remain both Christian and Neo-Platonist they had to blur the distinctions between the two. Yet most Elizabethan scientists, however warmly Neo-Platonic they might be in mathematics and cosmology, felt no urge to tamper with the stricter Christian concept of spirit. After all, for their science the only important question was to decide how extensive were the powers of devil and angel in the world of nature.

Angels offered little difficulty here. As close adjuncts of God having no independent purposes in the physical world they were

[2]Martin Luther, *A Frutfull Sermon Made of the Angelles* (n.d.), sig. D2v; William Perkins, *An Exposition of the Creede* in *Workes* (1605), pp. 164-66.

[3]Peter Martyr Vermigli, *Common Places* (1583), p. 86. George Gifford, *A Discourse of the Subtill Practises of Devilles* (1587), sig. D2r, chap. 5, headed "Devils have no power to hurt mens bodies or goods, but upon specill leave given unto them."

[4]See the discussion of natural magic in chapter 4 above and of Dee and Harriot in chapter 7 below. Also Vermigli, pp. 77-78.

virtually synonymous with Deity, and the problem of their operations upon matter could be treated in the same way as God's. But Satan, with his attendant demons, was more troublesome. Being the adversary of God and man, he was an alien will at loose in the universe. Moreover, he often engaged the imaginations and fears of human beings almost as much as did God himself. Consequently it became as necessary for the scientist as for the theologian to define his physical capacities. Those of his machinations which aimed at the spiritual temptation of man could be disregarded by the scientist as outside the sphere of science and inside that of divinity. But those which entailed dominion over the world of nature could not. In proportion as such dominion was unknowable it lessened man's understanding of nature and perhaps encroached on the concept of order.

Satan Exiled

I

The great principle laid down by theology in this respect was that whatever Satan did in the realm of physical nature he did by solely natural means.[5] He could use the laws of nature, but he could not dispense with them or create new laws. He could not, in short, work a miracle, since the miraculous was reserved exclusively for the omnipotence of God. Here a vital distinction was drawn between a wonder and a miracle.[6] The deeds of Satan in raising winds, hurling hail, beating down crops, and afflicting animals and men with disease were wonderful by human standards, but they fell short of miracles because in every case they merely combined and directed forces already existing in nature.

[5]For the general history and theory of witchcraft and demonology three of the more useful books are Wallace Notestein, *A History of Witchcraft in England from 1558 to 1718* (Washington, 1911); G. L. Kittredge, *Witchcraft in Old and New England* (Harvard, 1929); R. H. West, *The Invisible World* (Univ. of Georgia, 1939).

[6]Henry Holland, *A Treatise against Witchcraft* (1590), sig. C2v: Satan's works are not true miracles but "Sathanicall woonders, which the devill can with greater facility effect... then the cunningest man, because he excelleth in nature, in swiftnes of motion, and in knowledge.... Sathans woonders are produced of natural causes, & not supernatural, as Christs were." Aquinas, *Summa Theologica*, Pt. I, Q. 114, Art. 4; William Perkins, *A Discourse of Witchcraft* (1608), p. 18.

"I am certen," said Lambert Daneau, stating the consensus of all theologians in *A Dialogue of Witches* (1575),

> that Satan can doo nothing but by naturall meanes, and causes. For whatsoever hee doth eyther by him self, or by his Magicians & Sorcerers: it is altogither eyther illusion of their myndes and eyes, or only the true effect of naturall causes. As for any other thing, or that is of more force, hee can not doe it. . . . Fyrst, bicause that in woorking of miracles it behooveth to destroy & take away the nature from thinges which God hath geven them, which Satan can not doo: for it belongeth to god only, yt as he can create and make the nature of thinges: so can he also overthrow, and destroy it. Secondly, that in a miracle it is needefull to geve unto the thing, new vertues and properties, which he can by no meanes doe. For the true God is onely aucthour and creatour of the properties which are in thinges. . . .[7]

This grand barrier to the potency of the devil was basic in all Elizabethan thought about him. Its importance, as one can see, was to reduce him near the reach of human comprehension. Men might not be able to understand precisely how Satan raised phantoms resembling the bodies of the dead or wrought sexual impotence on the living, but they could rest assured that such things were on the same plane as other natural phenomena and, like them, susceptible of observation and study. Some of the awe and terror then went out of them. Satan remained superhuman, but his methods in the world of nature turned out to be essentially those which men had been using all the time. He was nothing but a superior kind of scientist. Instead of lurking shapeless, inscrutable, and infinite in the shadows, he was brought forward into visible outline and proportion. He too was humbled to the employment of natural causes and effects.

Of course, being all spirit without body, Satan retained enormous advantages. Incorporeal as he was, he could fly in an instant

[7]Sigs. I2v and I4v. Also King James I, *Daemonologie* (1597), pp. 22-23. Vermigli, p. 85: "... there are three things attributed unto spirits. First, that they can gather togither the principles & beginnings of things, out of which they know something may be made; and then can compound one with an other, and joine togither things that worke, with things that suffer: further, that they can moove & drive some things: lastlie, that they can put on bodies, & in them be familiarlie conversant with men." And James Mason, *The Anatomie of Sorcerie* (1612), pp. 16 ff.

to the ends of the earth or insinuate himself slyly into the human frame. Moreover, he had existed since the creation of the world, had outlived the generations of men and by virtue of his accumulated experience and original wisdom knew vastly more about the processes of nature than any individual human being could ever hope to learn.[8] Granted, he had no infallible insight into the future or into the thoughts of men, but from age-long observation of the external signs he could give probable guesses about both. Piercing deeply into the hidden causes of natural things, he could convert them to results unattainable by the human race. Yet when all was said, demonic knowledge of the cosmos exceeded man's rather in degree than in kind.

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If Satan was thus chained within the walls of nature, even more so were his disciples and victims, the witch and the sorcerer. These were only human beings. They could accomplish nothing beyond the ordinary except what the devil voluntarily chose to do for them in order the better to enslave their souls.[9] Though they might think otherwise, they were really not his masters but his bondsmen. And though he might teach them many a recondite secret about the physical world he could never teach them more than he himself knew. So they were, in the end, only the partial beneficiaries of a strictly limited power. Satan might commit his evils with or without their instigation. Many terrible storms were wrought and many notable disasters inflicted by Satan in the world of nature without their being requested by any witch. Nor was every demonic possession of a human being to be ascribed to the malice of some withered dame in the next village. Often the devil entered man's body to do his own unsolicited mischiefs. But usually he preferred to act at the behest of a magician or witch. So, when cases of bodily possession or other demonic

[8]Louis Lavater, *Of Ghostes and Spirites Walking by Nyght* (1572), p. 167: Satan may "bring incredible things to passe ... for he may through long and great experience, understande the effectes & force of naturall things, as of herbes, stones etc. and by meanes heereof woorke marvellous matters."

[9]Lambert Daneau, *A Dialogue of Witches* (1575), sig. F4v. Gifford, sig. F4r, the heading of chap. 8: "No man nor woman can give power unto the devill to doe hurt, neither doth their sending authorize him, but he useth them onely for a colour."

action arose, the Elizabethan almost always looked around for the witch who had requested them from Satan. By the end of the sixteenth century in England demonology and witchcraft had become closely merged, so far as consequences in the world of nature were concerned. In both, the effective agent was Satan, and, in both, his powers could not break out of the bonds of nature.

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William Perkins' *A Discourse of Witchcraft* (1608) grouped these powers under five heads:

> 1. The raising of stormes and tempests; windes and weather, by sea and by land; 2. The poysoning of the ayre: 3. Blasting of corne: 4. Killing of cattell, and annoying of men, women, & children: 5. The procuring of strange passions and torments in mens bodies and other creatures, with the curing of the same. . . .[10]

The first four types, dealing mainly with the world external to man, offered no difficulties to explanation as being done by the devil through solely physical means. Satan, as all orthodox theory agreed, procured winds, rain, hail, and other effects of climate by watching and using the forces well known to students of Aristotelian meteorology.[11] Assembling and combining various kinds of dry or moist exhalations in the appropriate layer of the atmosphere, he could get the same results which nature herself normally got. Should he wish to blast the crops on earth he might select a hailstorm, a flood, or a drought. In more savage mood he might so manage the temperature and composition of the air as to saturate the world with humors unhealthful to man and beast. Or there was nothing to prevent him from entering the bodies of cattle and altering the balance of humors essential to life. Struck by a wish to tempt or torment people, he might assume the form of a pet dog or cat, or make weird rumblings about the house at night. On occasion he might even appear as the ghost of some dead member of the family in order to make wicked suggestion to the living.[12] When he did so, he gathered together

[10]P. 128.

[11]Gifford, sig. D3r; Mason, p. 19; *Newes from Scotland of Doctor Fian* (1592), sig. B3r.

[12]Lavater, chap. 17; Vermigli, p. 87.

the vapors of the air and compacted them together to look like the departed. But he could never bring back the soul of the dead to the upper world. This, in the Protestant though not in the Catholic view, was irretrievably in hell or heaven and could never return. Here was one check on Satan's powers. Another was that he could never transform a beast into a man or a man into a beast, or a metal into an herb, or anything into what by nature it was not.[13] These deeds were miracles. If something of the sort seemed to happen it was an illusion of the devil, who was an artist in deceit.

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A more complex situation was raised by Perkins' fifth class of diabolical power, "The procuring of strange passions and torments in mens bodies." Satan might, for one thing, act on human bodies from the outside by changing the environment, rendering atmospheric conditions favorable to plague,[14] or presenting to the senses false data in the form of phantoms. By the latter method he could instill any illusions he wished, not merely through the phantoms of the dead but through any other kinds of visual apparition whatever.[15] Or he could cause trouble by getting inside the human organism. Once in, he might, said King James' *Daemonologie* (1597), bring on physical disease and

> . . . subtilie as a spirite so weaken and scatter the spirites of life of the patient, as may make him on th'one part, for faintnesse to sweate out the humour of his bodie: And on the other parte, for the not concurrence of these spirites, which causes his digestion, so debilitat his stomak, that his humour radicall continually, sweating out on the one parte, and no new good suck being put in the place thereof, for lack of digestion on the other, hee at last shall vanish awaie. . . .[16]

Inasmuch as prevalent medical theory was that all disease was due to an unbalance of the four humors, by upsetting them Satan was believed capable of inducing any kind of physical ailment.[17]

[13]Aquinas, loc. cit.; Daneau, sigs. F1v and F2r.

[14]Daneau, sig. E6r.

[15]Francesco M. Guazzo, *Compendium Maleficarum,* ed. Montagu Summers (1929), p. 9; James I, p. 22.

[16]P. 46.

[17]H. Institor and J. Sprenger, *Malleus Maleficarum,* tr. M. Summers (1929), Pt. II, Q. 1, chap. 11: "But there is no bodily infirmity, not even leprosy or epilepsy, which cannot be caused by witches, with God's permission."

Furthermore, because mental disease was likewise due usually to an excess or adustion of one or other of the humors he might in the same way engender melancholia, frenzy, and madness. Or he could, if he preferred, directly corrupt the five senses, making them incapable of relaying correct impressions to the brain. Finally, he might pervert the imaginative faculties, although he could never physically take over the soul. Le Loyer put it well in *A Treatise of Specters* (1605):

> So that it is not strange, that the divel having power permitted him (as is saide) to moove the humours, may also make and cause them waking to receive by the eies or other senses, diverse imaginations, figures, voyces, sounds and other things that seeme very strange & marvellous. And this is the cause (as Saint Augustine saith) That there is not any of the corporall senses, but the divell may possesse the same, and use it at his pleasure, if God do so permit him.... And by the same reason it happeneth also, That the divell dooth cast himselfe also into the inward and interiour senses, and into the fantasie of men, and mooveth them in the same sorte as he dooth the externall: and by a certayne extasie and alienation of their spirites which hee causeth; hee maketh diverse formes, specters, and phantosmes to appeare in their imaginations....[18]

Knowing the internal mechanism of body and brain, the devil might pervert it as he pleased, but always by taking advantage of its innate methods of functioning, always by observing natural law. Usually he simply set the morbific process in motion and then left the body. But in the most serious cases he remained sitting in the control tower of the brain. Then the case was one of genuine demonic possession. The victim might still seem to move his own limbs and speak with his own voice, but really he had lost all power over them. Satan pulled the muscles and used the vocal cords. Through them Satan spoke foreign languages, Greek and Hebrew, of which the victim knew nothing, blasphemed God, feared the sign of the cross, and hurled the limbs about in fearful contortions or fixed them in immovable rigidity.[19]

[18]Fol. 123r & v; also chaps. 9 and 12. Mason, p. 18; Perkins, *Discourse*, p. 23.

[19]*Malleus Maleficarum*, Pt. II, Q. 1, chap. 10. And see the controversy about exorcism between Harsnet, Darrell, Deacon and Walker, below, as well as the many cases cited passim by Kittredge.

Thus the idea of demonic possession was likely to be restricted by the Renaissance to what we would regard today as epileptic fits or the worst types of psychoses.

II

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So far, the general summation of orthodox Christian theory. For us its chief interest is to show how far Renaissance demonology had gone in incorporating the findings of contemporary physiology and psychology. Perhaps it would be possible to trace a steady trend in this direction from the time of the early *Malleus Maleficarum* (1487), which gave no clear notion of how Satan operated once he got inside a man's body. At all events, the fully developed Elizabethan theory of demonism a hundred years later was far from being fantasy in anything except its basic postulates. It had been whipped into a system using types of scientific explanation at every available turn. And what is particularly worth stressing is that this had been done not by students of natural science, for they had little to say about it, but by the theologians who wrote almost all the books on the subject. That rationalism had penetrated so deeply into what was potentially the most chaotic and irrational of topics is surely indicative of the temper of the times.

It had penetrated even farther than has yet been shown. Even the most orthodox demonologists were beginning to surrender some of the more incredible aspects of the creed. Elizabethan writers no longer believed that a witch, after rubbing herself with a magic ointment, could fly through the air to attend the Sabbat orgies.[20] If she flew at all—a matter of some doubt—it was because the devil carried her. And though she might copulate with the devil, the birth of human offspring seemed to many minds impossible.[21] Nor could she bewitch an enemy simply by looking at him with an evil eye. Either the enchantress used actual poison or Satan himself went to the bewitched and did the harm

[20]Perkins, *Discourse*, pp. 194-96.

[21]Le Loyer, fol. 126v; Ambroise Paré, *Workes* (1634), pp. 988-89; cf. contra, Henry Boguet, *An Examen of Witches*, tr. M. Summers (1929), chap. 13.

by physical means.[22] Again, she might think that by her spells she had succeeded in turning someone she hated into a wolf or a cat, but her belief was a delusion brought upon her by the very devil she pretended to use as her servant. Henry Holland's *A Treatise against Witchcraft* (1590) conceded that in such cases witches "may have also sundrie such Sathanicall delusions in many, which abounde in melancholy, but no reall transformation indeede."[23] The tendency to say that a witch was often deceived by Satan into thinking she did things she never actually could do was indeed on the increase.

Particularly significant of the direction of orthodox thought was the movement towards cutting down Satan's role as a cause of human disease. Writers like Le Loyer began to say that the devil does not enter a man's body until he finds a condition of ill health already existing, usually a superfluity of the filthy black bile in which he delights. If the bile is purged by medicines, he leaves with it:

> So, if the Divell doe once perceive that the braine is troubled or offended by any maladies or infirmities which are particularly incident thereunto: as the Epilepsie, or Falling evil, Madnesse, Melancholy, Lunatique fittes, and other such like passions: He presently taketh occasion to torment and trouble it the more: And (by the permission of God) seizing himselfe of the same, he dooth trouble the humours, amaze and confound the senses, captivateth the understanding. . . .[24]

The same idea was applied by Pierre Viret in *The Worlde Possessed with Devils* (1583) to the scriptural story in Luke 9:37-42 of the boy possessed by a devil.[25] Viret concluded that the boy first had epilepsy and that Satan, waiting until the disease was at its worst, then entered him and intensified it. But the climax of this point of view came in George Gifford's *A Dialogue Concerning Witches* (1593), written under the influence of Reginald Scot. In Gifford's opinion, the devil seldom even cooperated

[22]James I, pp. 44-46; Daneau, fol. F8r; Perkins, *Discourse*, p. 133 ff.

[23]Sig. F3r.

[24]Fols. 131 v ff. Cf. the opinions of the psychologists Huarte and Burton below.

[25]Second Part, sig. F3r.

with the disease. He merely looked around until he found somebody suffering from an illness which seemed likely to be fatal and then, without laying a finger to it himself, persuaded a witch that he had caused it at her request, so that "the most which the witches thinke their spirits doe kill at their request, doe die of naturall diseases."[26] Under this interpretation Satan cut anything but an impressive figure. He was a drone, not a worker in the precincts of nature and evidently was well on the way to being read out of them altogether.

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How much of this growing tide of concession was the result of the rationalistic attack leveled by Johann Wier, Reginald Scot, and their followers, and how much of it was, on the contrary, a necessary groundwork for that attack would be hard to say. Certainly Wier and Scot were able to begin from many doubts and exceptions which had been voiced by their more orthodox predecessors. The long-admitted difficulty of distinguishing a natural disease from one brought on by demonic action gave the new school some leverage for throwing most diseases into the category of the natural.[27] The acknowledged fact that a person suffering from melancholia often had delusions allowed argument that witches were only poor old women suffering from loneliness, frustration, and the devil's deception.[28] The accepted view that witches sometimes used poisonous drugs supplied by the Tempter[29] gave Scot, at least, good opportunity to say that many supposed witches were really sordid natural murderers. The idea, to which almost all books on this subject devoted a chapter or two, that what looked like the supernatural was often nothing more than crafty juggling by a human impostor, showed the rationalists a way to lop off a vast portion of apparently weird phenomena.[30] Melancholia, juggling, poisoning, and natural disease, which orthodox theory frankly discussed as rival explanations, were made

[26]Sig. E3r. Also Gifford, *A Discourse of Devilles*, sig. G4r.
[27]E.g. Guazzo, Bk. III, chap. 2, p. 167.
[28]E.g. Timothy Bright, *A Treatise of Melancholie* (1586), pp. 92 ff.
[29]E.g. James I, p. 44; Guazzo, Bk. II, chap. 1, p. 83.
[30]Perkins, *Discourse*, pp. 157 ff.

by Scot and those who thought like him to embrace so much of the field that what was left for witchcraft was in practice negligible.

Reginald Scot's *The Discoverie of Witchcraft*, published in 1584, was therefore the culmination of a type of rationalistic criticism already growing in vogue. In particulars it drew heavily on the medical information collected by Johann Wier, the Dutch physician, in his *De Praestigiis Daemonum* (1563). The method of Scot's book was largely Wier anglicized. But the Englishman emphasized his own significant theological premise for the attack on witchcraft. The devil, he said, is a spirit, not a body, and must be supposed to have only those powers fitting the incorporeal.[31] Being solely spiritual he can have no conference with witches except that of spiritual temptation, can make no compact with them, and can give no execution to their demands. It follows (and this seems to have been Scot's real view despite some colder qualifying words in the Epistle Dedicatory) that there are no witches in the traditional sense, and those who think themselves witches are either poisoners handling the usual kinds of drugs or deluded melancholics.[32] Others who set themselves up as witches are the merest impostors and sleight-of-hand artists, ventriloquists, and the like. Additionally, Satan has no power over rain, storms, lightning, and thunder.[33] He cannot possess human bodies or import disease into them. All such deeds are miracles, and miracles, said Scot brusquely, have definitely ceased long ago.[34] In short, Satan has none of the control over the physical world that has usually been conceded to him. His realm is the spiritual, and he must be relegated to that realm. His sole function is to whisper evil to man's soul. Any scriptural passages which may seem to

[31] *A Discourse upon Divels*, bound with 1584 ed. of *The Discoverie of Witchcraft*, p. 508, heading of chap. 12: "That the divels assaults are spirituall and not temporall." For Wier's doctrine and influence see Gregory Zilboorg's excellent book, *The Medical Man and the Witch during the Renaissance* (Baltimore, 1935).

[32] Sig. A4r of the Epistle.

[33] Pp. 2, 33, etc.

[34] Bk. 8, chap. 1, p. 156: "That miracles are ceased."

describe him as inhabiting the human body must be taken as moral allegories only.[35]

So with one sharp blow Scot sought to obliterate both witchcraft and diabolical possession by the radical device of banishing Satan completely from the world of nature and hence from the ken of science. Scot still did not side with the Sadducees and Peripatetics, much reviled by English writers on demonology, who contended that there was no devil at all.[36] To have done so in that era would have been tantamount to abjuring Christianity, and this move Scot showed no desire to make. But by stripping Satan of his sovereignty over matter, this pioneer among psychiatrists acted as a forerunner of the more radical rationalism of the seventeenth century, which was to deny Satan's existence altogether.

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Although Scot's ideas did not win general consent in his own day they had even then a significant progeny. A few outright partisans declared in their favor.[37] Among the orthodox they blew up a vast storm of discussion which yielded some concessions. One of their chief applications was to the dispute over exorcism which came to the fore just at the turn of the century. There Scot's ideas widely permeated the thought of the Anglican faction, consisting of the clergymen Samuel Harsnet, John Deacon, and John Walker, who denied that devils could be cast out of a possessed person either by the communal prayer and fasting of the Puritans or by the elaborate ceremonies of the Catholics. Correspondingly they formed one of the principal objects of attack by the Puritan pamphleteers John Darrell and George More.

Harsnet's main contention when he opened the dispute in *A Discovery of the Fraudulent Practises of John Darrel* (1599) was that Darrell and More, with the people whom they claimed to have cured by exorcism, were confederates in imposture. In proof he quoted not only the evidence uncovered by a commission of investigation but scores of similar cases of fraud throughout Eng-

[35]P. 510. [36]P. 491.

[37]See Nicholas Gyer, *The English Phlebotomy* (1592), sig. A4v.

land.[38] All cases of exorcism had to be shams, Harsnet argued, because true exorcism was a miracle, and miracles have ceased.[39] Now he did not say in so many words that there were no longer any demonic possessions in his day, but among all those instances of claimed possession which he narrated he did not admit the genuineness of a single one. His book therefore gave the distinct impression that he did not believe in demonic possession at all. Moreover, on the question whether a witch can cause a devil to enter her victim, Harsnet embraced Scot's skepticism: "Whether witches can send Devils into men or women (as many doe pretende) is a question amongst those that write of such matters & the learneder and sounder sort doe hold the negative."[40]

Who were "the learneder sort" but Scot and his pupils who were likewise favorably mentioned by name in other sections of the book exposing the frauds of pretended demoniacs? Consequently the analysis of Harsnet's real position by his Puritan opponent Darrell (*A Detection of Samuel Harshnet*, 1600) is a fair one:

> So albeit he doe not saye that none can be now possessed with divels, yet consideringe his covert carriage of him-selfe there-in, not once grantinge (I warrant you) in all his greate volume any such thinge, and that he will have all the possessed persons among us and the Papistes also counterfeits, as appeareth by this his first booke, who can conjecture any other, but that he holdeth, that none can be at this day possessed? In like-sorte I say he doth here by witches, not plainly denying any such to be, but secretly insinuatinge as much to the reader.[41]

A careful reading of Harsnet shows that he was applying Scot's methods throughout. And his writing the book under the protection of Bancroft, Bishop of London, whose chaplain he was, opens wide vistas of the tolerance of the Anglican Church for such ideas.

Even more outspoken in their adoption of some of Scot's the-

[38]P. 16, citing approvingly Scot, Bk. VII, chap. 1.
[39]Epistle to the Reader.
[40]P. 36. [41]P. 37.

ories were John Deacon and John Walker, the two Anglican preachers who in *Dialogicall Discourses of Spirits and Divels* (1601) entered the fray on behalf of Harsnet. The devil, they said, cannot possess essentially either men's minds or their bodies.[42] He affects the mind only by suggestion and deceit, or by such bodily ills as he is empowered by God to visit upon the human frame. Many diseases ascribed to him are of purely natural origin.[43] He is, in truth, a creature of strictly finite power, incapable of bringing about some of the states found in people said to be possessed. Contrary to common belief he cannot even cause rain, hail, thunder, and lightning.[44]

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As in Scot, the pressure of Deacon and Walker was to thrust Satan out of the physical world into the spiritual. They said nothing about witches, and perhaps wished no inferences to be drawn on that score, but it is worth noting that the logic of their argument required at least a curtailment and possibly even an abandonment of an important segment of witchcraft theory. For most possessions were thought to be worked by devils at the command of some witch, and if Satan himself lacked this power, then certainly so did the witch. In this particular she was left dangling like a superfluity, deluded and impotent. To read Harsnet, Deacon, and Walker is to watch the visible shrinking of superstition. But the time for a permanent victory of rationalism was not yet. After the exorcist controversy, helped along by the temporary triumph of Puritanism, there followed a reaction, which was gradually dissipated only towards the end of the seventeenth century. Perhaps the belief of the educated man in this intervening period is best typified in the cautious credulity of Sir Thomas Browne and the moderation of the physician John Cotta. The latter wrote in *A Short Discoverie of Ignorant Practisers* (1619):

> None truly learned, or that truly know the face of nature (whose schollers the learned ever professe themselves) can be upon the vaine flashes of seeming wonders lightly moved to denie or call into question the power and force of nature. With therfore the common

[42]Dialogue 2, pp. 31 ff., Dialogue 3, pp. 64 ff.

[43]Dialogue 7, pp. 201-208.

[44]Dialogue 7, p. 213.

amazed thoughts of vulgar people, to be blasted by the stupiditie of every idle feare, to gape after witchcraft, or to make nature a divell or a bugbeare, must needs be base proclivitie and unlearned lightnesse. To admit also nothing above or beside nature, no witchcraft, no association with divels at all, is no lesse madnesse of the opposite and extreame. But those whom true learning and wisedome hath well instructed, know how to stay themselves, and to consist in a temperate mediocritie betweene both these.[45]

III

Well might Cotta mark this cleavage between the via media of the educated man and the panic irrationality of the masses. It was deep enough. The enlightened thinker felt much more skepticism of the fantastic powers attributed to witches, more curiosity about the natural hows and wherefores, more alertness for imposture. But in the mind of the average man there was no doubt that devils could do the things reputed of them, and more too. His impulse was not to ask the natural means by which these wonders were accomplished but to drink wildly the full terror of their marvelousness. Omnipotence seemed scarcely too much with which to credit the devil. Harsnet wrote a vivid passage describing the state of the popular mind in Nottingham at the height of a scare:

> The pulpets also rang of nothing but Divels, and witches: wherewith men, women, and children were so affrighted, as many of them durst not stir in the night, nor so much as a servant almost go into his maysters celler about his businesse without company. Fewe grew to be sicke or evil at ease, but straight way they were deemed to bee possessed.[46]

Likewise the testimony given against witches in the court trials of the age, like that at St. Oses in 1582 or that of Dr. Fian in Scotland in 1592, breathes the same unthinking fear.[47] On such

[45] P. 56. Sir Thomas Browne, *Religio Medici*, ed. W. A. Greenhill (1881), p. 50.

[46] P. 8.

[47] *Newes from Scotland of Doctor Fian* (1592); W. W., *Witches at S. Oses* (1582); and the many accounts of trials detailed by Notestein and Kittredge.

occasions there was little pause to inquire into possible fraud, and none to delimit the enormous powers of Satan.

At the other extreme, science was gradually sentencing Satan to death in the physical world, sometimes by thieving away his powers, sometimes by sheer neglect. In Chapter 4 we have already seen something of this slow, erosive process. Robert Recorde stood as a good exemplar of the thieving. Discussing in *The Pathway to Knowledge* (1551) Archimedes' invention of perspective glasses which burned enemy ships at a distance, he added the general reflection:

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> ... many thynges seeme impossible to be done, whiche by arte may very well be wrought. And whan they be wrought, and the reason therof not understande, than say the vulgare people, that those thynges are done by negromancy. And hereof came it that fryer Bakon was accompted so greate a nigromancier, whiche never used that arte (by any conjecture that I can fynde) but was in geometrie and other mathematicall sciences so experte, that he coulde dooe by theim suche thynges as were wonderfull in the syght of most people.[48]

This was the same protest voiced by other scientists like Thomas Digges in his *Pantometria* (1591)[49] and John Dee, though with less justice, in almost every book he wrote during his long lifetime. It was uttered also by the more enlightened clergymen like William Fulke in *A Goodly Gallerye* (1563), an advanced treatise on the wonders of meteorology. In general it was a favorite theme of all believers in natural magic, like Agrippa, Raleigh, and Le Roy,[50] who were anxious to dissociate novel but genuinely natural scientific achievements from the whole atmosphere of necromancy. In sum, the recognition that many a marvel popularly

[48]Preface, fol. iii v. For similar comments on perspective glasses see Scot, p. 316; Le Loyer, chap. 8, fols. 70v ff.; Francis Bacon, *New Atlantis*, Bk. II; William Bourne, *Inventions or Devises* (1578), pp. 92-99. See the section on optics in the next chapter.

[49]Preface. See also Leonard Digges, *Stratioticos* (1597), p. 190. For Dee and Fulke see next chapter.

[50]Henry Cornelius Agrippa, *Three Bookes of Occult Philosophy*, tr. J. F. (1651), Bk. II, chap. 1, and *Of the Vanitie and Uncertaintie of Artes and Sciences*, tr. J. Sandford (1569), fol. 55r & v; Louis Le Roy, *Of the Interchangeable Course of Things*, tr. R. A. (1594), fol. 50r; Sir Walter Raleigh, *History of the World* (1614), Pt. I, Bk. I, chap. 11. See also chap. 4 above.

attributed to witches and devils might have in fact a plain natural cause was part of the tolerance of every thoughtful Elizabethan. Yet he might, and usually did, continue to believe in the existence of both.

Science and Religion in Elizabethan England

The natural philosopher, convinced though he might be of the traditional truths of demonology, seldom carried them over into his study of the physical world. Why should he? They introduced a principle of uncertainty, and they were not his business but that of the theologian. In this respect an analysis of representative Elizabethan works on medicine and psychology—the fields where Satan might be expected to be most active—is rewarding.

The extent to which Elizabethan medicine bothered about witchcraft and demonic possession as genuinely serious possibilities has been vastly overestimated. One can read dozens of treatises on all aspects of medicine without encountering a single reference to these subjects. The typical mood was that of Philip Barrough's *The Method of Phisick* (1596) or Petrus Valentinus' *Enchiridion Medicum* (1612) where whole chapters on melancholia, frenzy, and madness show no awareness whatever that Satan may have a hand in these conditions, and where demonic possession is not mentioned as a separate kind of ailment. Among those few medical books which did pay some attention to the devil as a cause of physical symptoms, Ambroise Paré's *Workes* (tr. 1634) and Andrew Boorde's *The Breviary of Healthe* (1542?) went farther than most in making concessions to popular superstition about Satan's powers[51] but chiefly, even here, in what we should today consider cases of epilepsy or mental illness.

The average physician, if he wrote of the powers of darkness at all, did so only in passing and only in order to say that many putative instances of demonism were nothing more than misunderstood physical and mental illnesses. The nightmare or incubus was a favorite case of this sort, exploded by such writers as Wirtzung, Valentinus, and Barrough.[52] Madness was another.

[51]Paré, Bk. 25, chaps. 13 ff.; Boorde, Bk. II, fols. 4r and 13v.

[52]Christopher Wirtzung, *The General Practise of Physicke* (1605), p. 150; Valentinus, p. 103; Barrough, p. 43; Boorde, Bk. I, fol. 44v.

Christopher Wirtzung in his comprehensive folio, *The General Practise of Physicke* (1605), described clinically a raging madman of whom "the common sort thinke no otherwise, but that he is possessed with a spirit."[53] Conrad Gesner's *The Treasure of Euonymus* (1559) prescribed a powder as a cure for certain such cases: "Manye also that bee Limphatici, that is, mad or Malancolicke, whome they beleved commonly to be resorted unto of Devils, we have cured them with ye same."[54] Perhaps the medical man's daily contest against local magicians and white witches of every kind increased his skepticism on these matters.

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At any rate, sponsored by such writers as Johann Wier and Reginald Scot, the explanation of witches as being often merely psychopaths had taken firm hold during the closing decades of the sixteenth century. *A Discourse of the Preservation of the Sight* (1599) by Andreas Laurentius exclaimed:

> Avicen noteth that melancholike persons sometimes doe such strange things, that the common people imagine them to bee possessed. How many famous men be there in this our age, which make scruple to condemne these olde witches, thinking it to bee nothing but a melancholike humour which corrupteth their imagination, and filleth them with these vaine toyes.[55]

The enlightened physician Edward Jorden wrote *The Suffocation of the Mother* (1603) to point out that this ailment, apparently a form of hysteria, should be distinguished from demonic possession:

> I doe not deny but that God doth in these dayes worke extraordinarily, for the deliverance of his children, and for other endes best knowne unto himselfe; and that among other, there may be both possessions by the Divell, and obsessions and witchcraft, etc. and dispossession also through the Prayers and supplications of his servants, which is the onely meanes left unto us for our reliefe in that case. But such examples being verie rare nowadayes, I would in the feare of God advise men to be very circumspect in pronouncing of a

[53] P. 130.

[54] P. 331.

[55] P. 98. See Zilboorg, Lecture 3.

possession: both because the impostures be many, and the effects of naturall diseases be strange to such as have not looked throughly into them.[56]

In other words, the devil was a last resort in Elizabethan medical diagnosis. Most doctors never got around to using him at all. His appearance, though still possible, was "very rare nowadayes" and should not be admitted until every other kind of natural explanation had first been tried. Moreover, Satan was no affair of the doctor's anyway. The only method of routing him was by prayer, and this was for the divines. So usually, in effect, the doctor simply passed the devil by.

In Elizabethan books on psychology the tendency was in the same direction, though far less emphatic. As a student of the soul and particularly of mental illness, the psychologist was more alert to the factor of evil than was his medical counterpart. True, a few writers like F. N. Coeffeteau (*The Table of Humane Passions*, 1621) and Thomas Walkington (*The Opticke Glasse of Humors*, 1607) paid, so far as appears, no attention at all to witches and devils. The greater number of psychologists, however, were considerably interested in the internal mechanisms through which Satan exercised his function as spiritual tempter and some of them also accepted, though more perfunctorily, the reality of demonic corporeal possession. Few took any cognizance of the devil as a real source of most mental illnesses. Thus the emphasis of Elizabethan psychology was upon Satan as spiritual tempter rather than physical cause.

Timothy Bright in *A Treatise of Melancholie* (1586), for example, diagnosed his patient's illness as natural melancholia mixed with guilt of conscience, not connected with sorcery, possession, or anything of the kind. Consequently he introduced the devil only to warn against satanic suggestions of despair, and in pre-

[56]Sig. A3r, passim. Gyer, sig. A4v, shared this view. John Cotta, *A Short Discoverie of Ignorant Practisers in England* (1619), p. 56, tried to hold open the possibility of witchcraft but used most of his space in arguing that various trances, sleeps, and convulsions were really natural symptoms of disease (pp. 59-72).

scribing therapy included no measures for physically expelling the supernatural.[57] Similarly, Thomas Wright in *The Passions of the Minde* (1604) described how the Adversary "by secret meanes can enter into the former part of our braine, and there chop and change our imaginations" or, alternatively, "can make us slothful in the way of God; by stirring the humors, altering the blood."[58] But these were means by which the devil effected his temptations. Wright showed no concern with him as a cause of physical and mental disease.

Juan Huarte in his *Examination of Wits* (1594) was a determined opponent of the idea of direct supernatural intervention, whether by God or by Satan, in man's psychological processes. Feeling constrained by his religion to admit the possibility of demonic possession, he was careful to restrict it to cases in which corrupt bodily humors, especially melancholy, made the body ripe for it. Satan, he added, could be got rid of by medicines purging such humors.[59] Even Robert Burton, while giving full credit to the great enemy of mankind as a source of melancholia and other physical-psychical diseases, made it clear that the devil acted through the mediation of the bodily humors.[60] The melancholy humor, said Burton, was "*balneum Diaboli*," the devil's bath; unless there were an excess of it he seldom entered the body. Appropriately, therefore, both medicines and prayer should be used in putting him out.

These allusions to the demonic supernatural formed very small portions of the total analysis of mental process and mental disease made by the writers just mentioned and by their colleagues in

[57]Chaps. 32-35, esp. pp. 225-26, 242 ff.

[58]P. 330. Similarly, Laurentius, *A Discourse of the Preservation of the Sight* (1599), p. 100, and Levinus Lemnius, *The Touchstone of Complexions* (1581), fols. 21v ff., treat Satan as tempter rather than as possessor or as cause of disease. Peter de la Primaudaye, *Second Part of the French Academie* (1605), pp. 167-69, and Jacques Ferrand, *Erotomania* (1640), pp. 208, 293, put more emphasis on Satan's physical role, but still not much.

[59]Pp. 92-94.

[60]Robert Burton, *The Anatomy of Melancholy,* ed. A. R. Shilleto (1896), I, 206 ff.; III, 453, 490.

psychology. It seems fair to conclude that the distinct trend among Elizabethan psychologists was either to shut out Satan and his legions altogether as active factors in diseases of the body and psyche, or to emphasize the physical methods of his intervention, hence the medical side of the situation, both in diagnosis and in therapy. On the other hand, there was no disposition to doubt Satan's spiritual role as the champion of evil.

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Scientists in all fields showed strong inclination to avoid talk of first and final causes, to concentrate instead on second causes and omit the supernatural causes lying behind them. The growing oblivion of Satan was part of that larger movement. Demonology as a lesser outpost of the supernatural felt first and most heavily this occupational neglect by the natural philosopher. One must add that the Elizabethan clergy as a whole showed few signs of being incensed. Indeed some of them, we discover, participated actively in the movement to minimize the physical powers of the devil. So long as Satan's threat to the values of the spirit was recognized as unabated, and so long as the phenomena taken away from his control by science were still traced back to the ultimate power of God, the loss to religious faith looked negligible.

IV

The final question is, What were the practical effects of the theories of demonology on science? We have remarked that in all areas of scientific study a new invention, a new experiment, might conceivably bring down upon the scientist from ignorant or prejudiced quarters an accusation of sorcery. With a few conspicuous exceptions like John Dee and Thomas Harriot, however, few Elizabethan scientists seem actually to have suffered this misfortune. Aside from one or two such headline cases, the problem of demonology was most genuinely urgent in the fields of medicine and medical psychology because according to orthodox theology Satan might be a factor in any disease the physician was called in to diagnose and treat. Thus the two main problems were to be able to tell what the signs of demonic interference were and

then to know whether physical therapy was of any use under the circumstances.

To the former much thought had been given in Renaissance books on witchcraft. The familiar organic and infectious diseases did not offer any serious ambiguities because although theoretically they might have been planted by a demon, he had presumably left them to take their natural course, and they were amenable to treatment in the usual way. These hit-and-run cases would include all those which seemed to be turning out normally as the doctor expected. The real difficulty began with the less familiar ailments affecting consciousness and personality. Renaissance thinkers were very well aware that the symptoms of physical and mental illness often closely resembled those ascribed to demonic possession. Who could tell, when a man fell foaming to the ground, whether he was stricken by epilepsy or by a possession or, indeed, by both at the same time? A burden rested on the demonologists to set up criteria of distinction for all such cases, and they were not slow to take it up.

The results, of course, were as intricate, word-splitting, and unreal as might be expected when intelligent men try to erect distinctions where none can validly be. Enmeshed in scriptural and authoritarian premises, the demonologists had somehow to reconcile them with existing medical knowledge. In the opinion of Institor and Sprenger in *Malleus Maleficarum* the decisive test was the verdict of physicians who were to judge from the incurability of the disease in question, its speed of onset, and its congruence with the patient's general condition whether or not it seemed natural.[61] Francesco Guazzo's *Compendium Maleficarum* catalogued no fewer than forty-five signs of the presence of a demon, ranging from physical symptoms like peculiar swellings, pains, and lumps moving around the patient's body, to his flight from holy things and his knowledge of foreign languages and other learning previously unacquired.[62] Three primary marks were thought enough by King James in his *Daemonologie* (1597):

[61]Pt. I, Q. 18, p. 87.

[62]Bk. III, chap. 2, pp. 167 ff.

I account the one of them to be the incredible strength of the possessed creature, which will farre exceede the strength of six of the wightest and wodest of any other men that are not so troubled. The next is the boldning up so far of the patients breast and bellie, with such an unnaturall sturring and vehement agitation within them: And such an ironie hardnes of his sinnowes so stiffelie bended out, that it were not possible to prick out as it were the skinne of anie other person so far.... The last is, the speaking of sundrie languages, which the patient is knowen by them that were acquainte with him never to have learned, and that with an uncouth and hollowe voice....[63]

For the school of Scot the problem happily did not exist, since they repudiated the whole idea of possession. But the majority continued to pile up these fabulous tests. At some point nearly all of them called for a decision upon the abnormality of the physical symptoms. Here the family of the sick man would naturally summon medical advice of some kind. If they resorted to one of the multitude of Wise Women and quacks who infested every neighborhood in Elizabethan England they were far more likely to get a verdict of witchcraft than if they consulted reputable physicians. The latter, as we have seen, went usually on the presumption that the disease was natural unless good reason arose for thinking otherwise.

But what were good reasons? That would depend on the level-headedness and breadth of learning of the individual practitioner. The more he knew, and the better he realized that there were many secrets of medicine yet undreamed of in his natural philosophy, the slower he would be to conclude that he was up against something supernatural. Wier the Dutchman and Jorden the Englishman would hold out to the last against any such diagnosis. But it is clear from *The Triall of Witchcraft* (1616) by the fairly enlightened physician John Cotta, whom we have quoted before, that there was a point beyond which the average doctor would surrender to the idea of the supernatural if the circumstances of the case were too amazing and too far outside his past experience.[64]

[63]Pp. 70-71. See also Darrell, *True Narration*, p. 5.

[64]See chap. 10, giving the distinguishing signs whereby a doctor may recognize a sickness springing from enchantment.

The next problem was whether, assuming that a case had been properly diagnosed as demonic, medical treatment could do any good. On this there was the widest scattering of opinion. Those like Le Loyer and Guazzo who granted the most extensive powers to Satan inclined to regard his poisons as too noxious, his derangements of the human organism too fundamental to yield to medical knowledge. The case was hopeless unless God intervened. Hence the only recourse was to prayer, and in this the physician must give place to the divine.

On the other side, the view represented by Henry Holland, *A Treatise against Witchcraft* (1590), had many partisans:

> First, as for the cure of any man, poisoned by Sathan, it is knowen by the experience of many learned phisitions, a thing most difficult: the reason is, sathan useth poisons that have hidden, unknowne, and straunge operations in the bodies of men, for he is an Empiricke of many yeeres experience; notwithstanding wee ought to use all good meanes that Phisicke offereth us, continually intreating the Lord so to blesse them, as they may be for our health. . . .[65]

Similarly, according to some like Huarte and Burton the mental condition of a possessed man might be alleviated by medicines which purged the melancholic humor or by bloodletting. Wier favored at least trying physical therapy in all cases and then turning over to the clergy those who proved to be incurable by physical means.[66] Considering the admitted difficulty of distinguishing natural from supernatural disease, and considering also that many people thought medicine might be a help even in the latter contingency, one would suppose that the Elizabethan family would use both medical and religious remedies in a doubtful case. Statistics of course are lacking.

From the foregoing it seems clear that even the theologian writing on demonic disease did not wish to keep the doctor away

[65]Sig. H1r.

[66]*Histoires des Illusions et Impostures des Diables* (1579), Bk. V, esp. chap. 28, p. 574.

from the sick man's bedside.[67] A medical diagnosis was helpful in deciding whether or not the case was one of possession, and medical aid, as many thought, should be given a chance even if it was. I suspect that there were few supposed demoniacs whom a physician, qualified or otherwise, did not at some stage examine and prescribe for. The danger was that the patient might be too quickly given up to the priest, either by distraught relatives or by the baffled doctor himself. Still worse was the possibility that one of the so-called white witches, or good witches, in the vicinity might be called in on the theory that you should set a witch to catch a witch. Beyond that, a belief that all extraordinary developments in an illness might be due to a devil was dampening to the spirit of research. The beginning of progress in the understanding of rare disease is a faith, in medicine, that it must have a physical basis and, in psychology, that it must follow an intelligible pattern. As already shown, such a faith was struggling to be born in the medical men of the age.

Except among a few outright atheists, Satan was still a reality for the soul. Not even Scot denied him that dreadful function. But the devil's reality for the body was under close scrutiny, and it is an open question whether more ultimate damage on this score was done to him by the school of Scot, which rejected the reality altogether, or by the physicians who neglected the whole idea, or by the orthodox apologists who insisted on defining it in the language of contemporary science. Indeed, the gap between the first and third schools was narrower than it seemed. Orthodoxy measured Satan with rule and level, explored his coasts, circumnavigated him, and of course ended by discovering that he was smaller and less formidable than had been supposed. Here the theologians were almost as naturalistic as the scientists themselves. Once orthodoxy had accepted the touchstone of probability suggested by natural philosophy, it became ready to reject as miraculous and therefore impossible a number of the stranger powers formerly attributed to the devil.

[67]See specifically Boguet, the heading of chap. 38: "That he who is bewitched can avail himself of physicians."

Thus as Satan's abilities were made more concrete, they simultaneously were made fewer and weaker. Scot finished the process by blotting them out completely. What was left to Satan then was the realm of the spiritual, the immaterial. But as the seventeenth century wore to a close his lease even on this realm seemed to rationalistic minds increasingly untenable. Human practicality found hard to credit the existence, in any sense, of a spirit having no power to make things happen in the world of physical nature. Perhaps it is significant that the word "immaterial" bears a double sense—that of not consisting of matter and that of not mattering. So when Satan lost the world of matter, gradually for many minds he altogether ceased to matter.

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7

The Old Heaven and Earth

IN the foregoing chapters on God's Providence and on demonic agency much has been said of the operations of what the Elizabethans considered the two higher orders of spirit upon the world of physical nature. But the Elizabethan concept of this world was itself undergoing a revolution at the hands of the Copernicans in the closing decades of the sixteenth century. And with this revolution inevitably—so closely interlinked were ideas of God and nature—went some readjustments in religion.

Was it still possible to believe that God made the world for man? Here lay the great question for Christianity as the geocentric gave place to the heliocentric universe. It was a highly complex question demanding no simple answer. Man's uniqueness, the quality of God's moral government of the universe for human good, the possibility of miracles, the authority of Scripture to teach truth about the physical world—these and many cognate issues all seemed at stake. Upon the answers then and since given has depended in large measure the later history of religious faith. First, therefore, the meaning of the old cosmos for Christianity and then the meaning of the new will be considered in the three chapters following.

I

Three chief theories of the nature of matter were available to Elizabethan science. The first, almost universally adopted, came from the Greek physicists through Aristotle and saw matter as composed of the primary qualities, heat, cold, dryness, moisture, combining to form the four elements, earth, water, air, fire. A second, deriving from the alchemical tradition and popularized

by the Paracelsans, reduced everything physical to three chemical components, the famous *tria prima* comprising salt, sulphur, and mercury.[1] It had some currency, mainly in the fields of medicine and pharmacology. The third theory was the ancient atomism of Democritus and Epicurus. Though rather widely known to Elizabethans,[2] especially as a possible explanation of the nature of the soul,[3] and though accepted by a few, as in George Baker's adaptation of Konrad Gesner's *The Newe Jewell of Health* (1576),[4] it remained for the time being a remote speculation rather than a genuine working hypothesis. The time for it was not yet ripe.

Theologically there was no unassailable reason for favoring any one of the three over the others. A Christian might have faith in God and win salvation whether the world of his body was built of hooked atoms or of the four primary qualities[5] or of chemical combinations of salt, sulphur, and mercury. True, atomism through historical accident carried some guilt by association with the irreligious doctrine of chance sponsored by Epicurus and Lucretius, particularly the latter, but of itself the atomic hypothesis was innocent enough. Nothing in Genesis required a Christian to believe that God was an Aristotelian. In fact, Thomas Tymme, who was both a Christian clergyman and a Paracelsan, showed in *A Dialogue Philosophicall* (1612) that the Mosaic account of creation might successfully be interpreted in Paracelsan terms as

[1]James Campbell Brown, *A History of Chemistry* (London, 1920), esp. pp. 39 and 129-30; John M. Stillman, *The Story of Early Chemistry* (New York, 1929), esp. pp. 38-55 and 290-93; Lynn Thorndike, *History of Magic and Experimental Science* (New York, 1941), V, chap. 29; and Paul H. Kocher, "Paracelsan Medicine in England," *Journal of the History of Medicine*, II (1948), 451-80.

[2]E.g. John Calvin, *Institutes* (1587), fol. 7r; Theodore Beza, *Job Expounded* (1589?), sig. C7r & v: "Whe knoweth not the wicked opinion of the *Epicures* attributing all things to the concourse or meeting of their small motes which they call *Atomi*?" Francis Bacon, *Novum Organum*, Bk. II, Aph. 8; and Charles T. Harrison, "Bacon, Hobbes, Boyle, and the Ancient Atomists," *Harvard Studies and Notes in Philology*, XV (1933), 191-219.

[3]Palingenius, *Zodiake of Life* (1588), Libra, p. 127 (misnumbered 119); John Davies of Hereford, *Microcosmos* (1603), p. 218.

[4]Fol. 4r.

[5]For the indirect effects of the shift from this qualitative physics to the quantitative physics of Galileo and his successors upon the Christian world view, see E. A. Burtt, *Metaphysical Foundations of Modern Physical Science* (1932).

a differentiation by God of the original chaotic matter into basic chemical constituents.

What the Genesis narrative did seem to require was rejection of the idea of any such pre-existing chaos as Ovid in his *Metamorphoses* gave to the gods as raw material for building a world;[6] or the idea that God made more than one universe.[7] Renaissance theologians of all faiths therefore explained Scripture as meaning that God created matter out of nothing, compacting therewith one universe and all creatures in it through a process lasting six days.[8] It might be permissible to take this account allegorically, but the allegory must supplement, not supplant, the literal meaning.[9]

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With the crumbling of the Aristotelian-Ptolemaic cosmos it became imperative for Christians to disengage themselves from its ruins and to realize that no one theory of matter, and no one cosmology based upon it, was indispensable to their faith. More of this presently. But first, in order to understand why the process of disengagement was as slow and painful as it was, we must see at how many points during the long centuries of scholasticism this old cosmos had become meshed with Christian thought.

Above all, the Aristotelian-Ptolemaic universe was perfectly adapted to the prime Christian idea that the world was made for man.[10] Earth, his habitation, though dark and tiny, was the center

[6]Palingenius, Aquarius, pp. 220-21. Milton's ideas to the contrary led him into heretical views of the nature of God (*Paradise Lost*, Bk. VII).

[7]Saluste Du Bartas, *Devine Weekes* (1605), First Day of First Weeke, pp. 10 ff. This idea, however, was not inconsistent with the possibility that God might have made many habitable planets within the one universe. See John Wilkins' argument in *The Discovery of a World in the Moone* (1638), discussed in the next chapter.

[8]See any of the Renaissance commentaries on Genesis cited in chap. 2, above.

[9]Martin Luther, *A Commentary on Genesis*, ed. J. N. Lenker (1904), p. 41: "Equally useless is it to consider Moses in the beginning of his history as speaking mystically or allegorically. For . . . he is not instructing us concerning allegorical creatures and an allegorical world. . . ." As usual, there was a minority of dissent.

[10]General cosmological summaries may be found in Diadochus Proclus, *The Description of the Sphere*, tr. W. Salysburye (1550); Robert Record, *The Castle of Knowledge* (1556); E. M. W. Tillyard, *The Elizabethan World Picture*

of the universe and the sole fixed point about which wheeled the entire stupendous structure. It was therefore in the full sense unique. Oceans lapped it; over them folded successive circles of air and fire (though some thinkers had long discounted the fire). Here was the elemental world composed of Aristotle's earth, air, water, and fire, a region of continuous generation and corruption, perpetual decay, perpetual renewal. For within the limits of the orb of fire bounded by the moon's sphere the elements went through an unending cycle of motion and transmutation: fire into air, air into water, water into earth, and so back up the ladder again.[11] All this under the drive of the motion imparted by the upper spheres and the animating heat of the sun.

The Old Heaven and Earth

These processes of decay and rebirth, however, ended at the sphere of the moon. There, and in all the ethereal region extending upward to the outer crust of the universe, nothing ever changed until the Last Judgment. Locked within seven solid spheres revolving in the appropriate different periods, seven planets – the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn, in ascending order–moved but did not in any of their parts know birth or death. Above them, likewise permanent in perfection, were the spheres of the fixed stars, the crystalline heaven (omitted in some accounts), and last the primum mobile or outer limit of the world, set in motion by the finger of God to revolve completely once every twenty-four hours and carry with it all the spheres below. Beyond these were no time and space. The world ceased, but all around it–not as symbol but as fact–stretched the illimitable empyrean, home of angels, blessed spirits, and God. Motionless, pure, bright, everlasting it was known to be. Over questions about its size, shape, and other prop-

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(1943); Francis R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore, 1937), chap. 2. To this latter book I am especially indebted. For A. O. Lovejoy's rather different analysis of the religious implications of the shift from the old to the new cosmos see *The Great Chain of Being* (Cambridge, Mass., 1936), Lect. IV.

[11]Aristotle, *De Generatione et Corruptione* and *De Caelo*, along with *Physica* and *Metaphysica*, supply the basic ideas.

erties, however, religion threw her mantle while science averted her eyes. Little could be learned about such questions even from the word of God.

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Other and more controversial cosmological details are of no concern here. The greatest and most overwhelming fact about this Aristotelian-Ptolemaic universe in its assimilation to Christian ideals was that it centered upon man—in intent and in the geocentric formula which consummated that intent. Less obvious but, as we shall see, importantly integrated into this fact was the radical distinction drawn between the elemental region of change below the moon and the ethereal region of permanence above it.[12] This distinction arose from Aristotle's belief that ether was not one of the four elements or any combination of them but a quintessence, a fifth and extraordinary substance not subject to alteration. Yet the differentiation was perhaps not incompatible with Platonic views that the supralunar skies were composed of the four elements in a purer form. At any rate, believing that no natural change could occur above the moon, many Elizabethans felt constrained to interpret as supernatural, as miraculous, any new phenomenon appearing there. Hence, after 1572, the controversies as to whether novas and comets were miracles; hence also the shock for many minds in discovering that they were not; hence, again, the repercussions upon their belief in God's messages through nature to mankind; and hence, finally, still further repercussions upon their faith that the world was planned for man.

II

This, however, is to anticipate. Whatever their differences of opinion about Copernicanism, Elizabethan cosmologers could agree that the universe was mathematical through and through. The combination of a sternly mathematical approach with an eager but amorphous mysticism was the paradox of the Neo-Platonism which strongly affected most of the major astronomers

[12]For a good Renaissance account read Du Bartas, Second Day of First Weeke, pp. 65-66.

from Robert Recorde on. Under Pythagorean influence Plato had represented in the *Timaeus* both God's creation of the world and his infusion of the *anima mundi* as picturable by geometrical figures and arithmetical proportions. Mathematics was thus built into the fabric of the Platonic universe; or, more exactly, that universe was built according to mathematical principles. Ptolemy proceeded on the same assumption. Like other phases of Platonism this basic idea could be and early was readily assimilated into the Christian world view. All that was needed was to make the Christian God the architect of this mathematical universe.[13] The result was the maxim, God geometrizes. How it was reached by drawing on a text from the Book of Wisdom declaring the Deity to have created the world by measure, number, and weight can clearly be seen in William Bedwell's Preface to his translation of Peter Ramus' *The Way of Geometry* (1636):

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> Plato saith, That God doth alwayes worke by Geometry, that is, as the wiseman doth interpret it, Sap. XI, 21. Omnia in mensura & numero & pondere disponere. Dispose all things by measure, and number, and weight: Or, as the learned Plutarch speaketh, He adorneth and layeth out all the parts of the world according to rate, proportion, and similitude. Now who, I pray you, understandeth what these termes meane, but he which hath some meane skill in Geometry?[14]

Few Elizabethan writers on mathematics failed to bring in somewhere this idea of God the geometer. It was the strongest link between their subject and religion. It helped to justify, too, the expenditure of a man's time on mathematical studies. "Geometrie," argued Dee in his famous Preface to Sir Henry Billingsley's translation of Euclid's *Elements of Geometrie* (1570), "is the

[13] John Dee thus quoted Boethius in the Preface to Euclid's *Elements of Geometrie*, tr. Henry Billingsley (1570), fol.*1r: "All thinges (which from the very first originall being of thinges, have bene framed and made) do appeare to be Formed by the reason of Numbers. For this was the principall example or patterne in the minde of the Creator."

[14] Sig. A5v. See also the excellent long survey of the interrelations of religion with mathematics by Thomas Hill in the Preface to his *Arte of Vulgar Arithmeticke* (1600), sigs. B3r ff.; Thomas Fale, *Horologiographia* (1593), "To the friendly Readers"; Robert Mason, *Reasons Academie* (1605), pp. 2-5; Du Bartas, "The Columnes," Second Day of Second Weeke, pp. 472 ff. Dee's Preface to Euclid ended with citation of this text, sig. A4v.

knowledge of that which is everlastyng. It will lift up therfore (O Gentle Syr) our mynde to the Veritie . . . that we may turne or convert, toward heavenly thinges (both mynde and thought) which now, otherwise then becommeth us, we cast down on base or inferior things. . . ."[15] That is, by mathematics we come to know God's works, and thereby God himself. Evidently the case for mathematics followed the pattern of religious justification familiar in all the other sciences. And it is only what we expect when Robert Recorde's *The Whetstone of Witte* (1557) claimed also to show how knowledge of Pythagorean number mysticism helped to clarify many truths in divinity: "Betwene Trinitie and unitie, doeth consiste the full grounde of al Divinitie." The number seven was significant for the first week of creation and so forth. "In Divinitie," Recorde concluded, "there are greate hidde secretes in nombers. So that diverse excellente Divines, have written whole Bookes of the misteries of nombers."[16]

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By and large, these arguments in justification of mathematical study were quite acceptable to the Elizabethan clergy. It is of course true that the word "mathematician" was in such bad repute in some quarters as to be virtually a synonym for "magician" or "atheist," or a combination of the two. Thomas Nashe branded, in his well-known indictment of atheists, the "Mathematicians abroad that will proove men before *Adam*."[17] Perhaps he meant the great astronomer and mathematician Thomas Harriot, who likewise seems to have been accused by the Jesuit Robert Parsons of heading Raleigh's "school of atheism." But here Harriot's name was blackened less by his actual scientific work than by his asso-

[15]Sig. a2v; also b2r.

[16]Preface, sig. B1v. Dee, sig. a3r: "...the litterall Text, and order of our divine Law, Oracles, and Mysteries, require more skill in Numbers, and Magnitudes: then (commonly) the expositors have uttered." Bedwell, loc. cit., argued that geometry clarified "The Fabricke and bignesse of Noah's Arke: The Sciagraphy of the Temple set out by Ezechiel . . .," etc. For an account of the use of astronomy by Kepler, the Jesuit Deckers, and the Englishman Thomas Lydiat in calculating the date of Christ's birth, see M. W. Burke-Gaffney, *Kepler and the Jesuits* (Milwaukee, 1944), p. 19 ff.

[17]*Pierce Pennilesse* (1592) in *Works of Thomas Nashe*, ed. R. B. McKerrow (1914), I, 172.

ciation with the putative freethinking of the Raleigh circle. Also John Dee's reputation was not of the best, but in some degree deservedly so. Neither scientist's case was representative.

On the contrary, the very great majority of writers on pure or applied mathematics had little to fear even from gossip. Robert Recorde, Thomas and Leonard Digges, John Blagrave, John Napier, and numerous professors of the mathematical sciences at the universities and at Gresham College went through their lives without blame, rather with considerable honor. What was feared by the sticklers outside the science was its possible use in black magic, astrological calculations, or heretical computations of the age of the world, and the like. But in the eyes of most fair-minded men and of the Church, its possible abuse did not cancel its great and growing utility in such fields as astronomy, navigation, surveying, ballistics, and gunnery. We should not be misled by a few vulgar outbreaks or by the malice of satire and religious controversy. In condemning astrology, Bishop Hooper gave voice to the distinction almost always carefully drawn between licit and illicit mathematics:

> Though I do by the authority of God's laws and man's laws damn this damnable art mathematical, I do not damn such other arts and sciences, as be associated and annexed with this unlawful astrology. As is geometry and arithmetic, these be necessary for every man: specially arithmetic, for she extendeth, as a necessary aid, not only unto all sciences, but also to every liberal art and condition of life. . . . They be the gifts of God, and to be honoured; because they come from him only, that giveth all goodness.[18]

Hooper's was the view of the average educated man, as well as that of the clergy.

III

Before the disturbing implications of Copernicanism began to take shape towards the turn of the century, the Elizabethan clergy likewise looked with much favor on astronomy. To be sure, any churchman who had no use whatever for science might

[18] *Early Writings of John Hooper*, ed. Samuel Carr (1843), Parker Society, XX, 330. Cf. other citations in chap. 1, above.

applaud Henry Bullinger's warning to those "so far crept into the study of astronomy and the astronomer's heaven, that they quite forget the blessed heaven, which is the seat of the blessed saints, anything to pertain unto them."[19] This, however, was merely the usual clerical objection to the power of every science, or of every worldly occupation for that matter, to distract men's thoughts from salvation. One may venture to say that among all the physical sciences pre-Copernican astronomy was the favorite of divines in all churches. It offered few dangers to faith. Unlike astrology it made no forecasts which might warp the motives and morals of Christians or lessen the dignity of God. Unlike the medical sciences and psychology it did not encroach upon the integrity of the soul or seem to assume merit for a deliverance which must come ultimately from on high. In short, it was a science of contemplation, not of action. As such, it escaped involvement in the perplexities of daily human conduct and faith over which brooded the watchfulness of the Church. And its objects of contemplation, stars and planets with their high ascetic beauty, their symmetries of fire in the vastness of the night, were powerful to lift up the soul in rapture to the supreme Architect.

Consequently, even those English divines and others who were most bitterly opposed to judicial astrology took care to distinguish it from pure astronomy and uttered only praise for the latter. In his *Antiprognosticon* (1560) the Puritan William Fulke called it "of all humayn sciences . . . the most divine" and wished all philosophers to study it.[20] Calvin, James I, George Gifford, Henry Howard, and many others gave strong recommendations for astronomy while reviling astrology.[21] And John Chamber, who attacked the astrologers in *A Treatise against Judicial Astrologie*

[19]*Decades*, ed. Thomas Harding (1849-52), Parker Society, X, Decade 5, Sermon 10, p. 483.

[20]Sig. A5r. Melanchthon's Preface to Sacrobosco's *De Sphaera* (1578), sig. A3r, likewise argued that the study of astronomy leads men to God.

[21]Calvin, *Admonicion agaynst Astrology Judiciall* (1561), sig. B8v; James I, *Daemonologie* (1597), p. 13; George Gifford, *A Discourse of Devilles* (1587), sigs. B4r and C1r; Henry Howard, *Defensative against the Poyson of Supposed Prophecies* (1583), sig. N4v.

(1601) wrote in contrast an *Astronomiae Encomium* (1601) judging astronomy "very instrumentall, and helpfull to our salvation, since neither nature, nor art hath any thing more potent to stir us to the knowledge of God then the contemplation of heavenly motions."[22]

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To this religious encouragement many writers on astronomy responded with full warmth of devotion. Especially pious were handbooks designed for the common reader, such as William Caxton's *The Myrrour of the Worlde* (1529) and Anthony Askham's *A Lytel Treatyse of Astronomy* (1552), but many works on a higher level, like William Cunningham's *The Cosmographicall Glasse* (1559),[23] also embarked on a study of the heavens as a means of approaching God through his works. Among the scientists of real eminence there was a variety of individual reaction which can be exemplified in three very different personalities before the close of the century: Robert Recorde, John Dee, and Thomas Hood.

Robert Recorde was a practicing physician, a prominent writer on medicine, mathematics, and astronomy, and also an ardent Protestant reformer in the 1550's when the going was hardest. Although he looked with favor on the Copernican theory, its implications had not transformed his philosophy. Recorde thus united in his own person some of the most explosive elements in the confrontation between science and religion, yet reconciled them in successful harmony. His *The Castle of Knowledge* (1556) was both a far-sighted and rational treatment of astronomy and an expression of religious devotion. It opened with an ecstatic paean to the beauty and uncorruptibility of the heavens:

> Oh worthy temple of Gods magnificence. Oh throne of glory and seate of the Lord: thy substance most pure what tongue can describe? thy beauty with starres so garnished and glittering . . . Oh marvelous Maker, oh God of good governance: thy works are all wonderous, thy cunning unknowen: yet seedes of all knowledge in that booke are sowen. . . .[24]

[22] P. 34.

[23] E.g. Preface, sig. A4v, fols. 9r and 39r.

[24] 1596 ed., sig. B3v.

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When Recorde quoted, as did almost every other Elizabethan astronomer, Plato's saying that God gave man eyes to look up to the divine work of the firmament, he voiced not an empty formula but a passionate conviction. So wonderfully did astronomy lead to the knowledge of God's plan that, in Record's opinion, "there was never any good astronomer that denied the majestie and providence of God."[25] Again like most other Elizabethan treatises on the science, Recorde's book welcomed as a miracle the universal eclipse of the sun at the time of Christ's Passion.[26] And it concluded the discussion with a prayer. Yet in the other 230 pages of the book Recorde presented, besides a clear exposition of the Aristotelian-Ptolemaic universe, the first defense of Copernicanism in English and a sane attack on authoritarianism in science, which made the work a landmark in Elizabethan thought. Here faith and reason stood in delicate balance, both strong, neither destroying the other, integrated in a personality at peace with itself.

Because of their differences in subject-matter, Recorde's books on arithmetic and geometry, *The Pathway to Knowledge* (1551), *The Ground of Arts* (1540), and *The Whetstone of Witte* (1557), contained less religion. Piety was not so easily evoked by fractions and equilateral triangles. All three prefaces sought to persuade the reader that mathematics was a matchless subject which he would do well to learn. The invariable method was to argue that it was the key to all the arts and sciences, that Plato and Aristotle had both said so, that it was necessary to a study of divinity because "God was alwaies workinge by Geometrie,"[27] and that it had many practical uses to farmer, builder, merchant, navigator, and gunner.

This kind of over-all justification of the science treated was not, of course, peculiar to books on mathematics but was a commonplace of most Elizabethan prefaces on any subject from

[25] P. 230.

[26] P. 229. Also Leonard Digges, *A Prognostication Everlastinge* (1576), sig. D2r.

[27] *The Pathway to Knowledge,* fol. 1v.

horsemanship to political theory. The utilitarianism of the age required that the author always demonstrate what practical ends his material would serve. Dee bowed to the tradition in his Preface to Euclid, Leonard Digges in the Address to his *Tectonicon,* and so with others. Recorde's moral idealism made him feel it his Christian duty to share his learning: "These excellente giftes are not lent unto men to be hidden. And there are a great multitude that thurst, and long moche for soche aide."[28] In men like him the urge to science allied itself naturally with the urge to morality. What may well strike us about these three prefaces, however, is their relative inattention to the religious element. Recorde certainly did not give the impression of fearing any assault by religion on mathematics. On the contrary, he displayed an inner security that religion was on friendly terms with his subject and that he was serving God by helping to lift men up to the divine through a contemplation of mathematical law.

For rather unique reasons John Dee did not share the peace of the astronomers. Most of the leading scientists of the time respected his encyclopedic learning; many of them were his students. He was the scientist's scientist, the master of those who knew. Sir Philip Sidney studied chemistry under him, and the Queen herself consulted him about the comet of 1577. Nevertheless, he acquired early in his career a reputation as a conjuror. And in 1583 a mob wrecked his library at Mortlake, stealing his books and hacking his instruments to pieces.[29] The temptation is to sympathize with him as a martyr of science victimized by the rancor of the ignorant and the malice of the priest. But a closer look shows that he earned his evil fame precisely because he did not stick to what the Elizabethans considered or we today consider natural science. Besides being deep in judicial astrology and

[28] *The Whetstone of Witte,* sig. A2v.

[29] See *The Compendious Rehearsall* (1592) in *Autobiographical Tracts of Dr. John Dee,* ed. James Crossley (Manchester, 1851) for the Chetham Society, XXIV, 27-32. For an interesting recent analysis of Dee's thought, see Hiram Haydn, *The Counter-Renaissance* (New York, 1950), pp. 193-95. Also Edward W. Strong, *Procedures and Metaphysics* (Berkeley, 1936), pp. 204-12.

alchemy, both condemned by the English clergy, he engaged for years in seances with a series of rascally mediums to call up spirits from whom he hoped to learn the secret of the philosopher's stone. The pathetic details of a fine intellect wasted were written down by Dee himself in his *Diary*[30] and in the manuscript later edited by Meric Casaubon, *A True Relation of Dr. John Dee and Some Spirits* (1659). Dee chose to name these spirits angels, but by the verdict of Elizabethan Christianity they must be devils, since angels would have no such commerce with men. The case was therefore not one in which the scientist was condemned for making physical experiments beyond the grasp of his contemporaries. It was one in which the scientist consciously abandoned science to resort to the supernatural.

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To see why Dee took the step is to go back into the Neo-Platonism of his *Propaedeumata Aphoristica* (1568) and *Monas Hieroglyphica* (1564). He believed in the hidden sympathies and antipathies of things, the transmission of the forces of the super-celestial intellectual world to earth through the stars and planets, and the existence of spiritual beings of a high order not quite synonymous with the angels of Christianity. He had, in short, something of the same blend of mathematics with a sense of the presence of mysterious spiritual vitalities which characterized the later disciples of Plato. He had also, it would appear, very little common sense, much credulity for a glib story, much egoism and showmanship, and not much money. A short cut to the secrets of the universe and the wealth and fame they would bring seemed highly desirable. So Dee became perhaps the only kind of Dr. Faustus who exists in real life, one who sold his soul to what he considered the angelic spirits of the world. He never admitted even to himself that he had broken the laws of Christianity. Nursing a bitter persuasion of persecution and outrage, he filled the prefaces of many of his published books with protestations that science leads a man to God and that he himself had used in his

[30] *The Private Diary of Dr. John Dee*, ed. J. O. Halliwell-Phillipps (1842) for the Camden Society. See also Charlotte Fell-Smith, *John Dee* (1909).

scientific pursuits only perfectly legitimate means.[31] Dee's laboring of these accepted general links between science and religion and the violence of his assertions of his own orthodoxy, though no doubt he was self-convinced, must be seen in relation to the personal crisis out of which they arose. Apart from them Dee does not seem to have had a strong passion for Christianity. His religious feeling diffused itself in a vague pantheism, and he appeared much more interested in the inner workings of the world than in the future of his own soul.

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Lest Dee's career be regarded as in any way typical, it should be set off against the honored life of a mathematician like Thomas Hood. He was a man of the new breed which was to become increasingly prevalent among scientists. Lacking the religious fervor of Recorde and Thomas Digges and the misdirected but authentic imaginative glow of Dee, he possessed instead a shrewd practical mind with a flair for teaching mathematics as applied to military needs, navigation, and the use of such instruments as the sector and Jacob's staff. He was chosen to lecture on mathematics to the captains of the armed bands levied in the Armada year, 1588. And most of his books thereafter, among them *The Use of the Celestial Globe in Plano* (1590), *The Marriners Guide* (1596), and *The Making and Use of the Sector* (1598), were wholly technical in nature. Failing to make an adequate living by these means, he did not, like John Dee, fall to invoking spirits but retreated sensibly into the practice of medicine, where presumably he did not starve.

Religion had a formal and perfunctory part in some of Hood's works. He admitted it into *A Copie of a Speache* (1588) because that was a full-dress inaugural lecture on the value of the mathematical sciences. We must tread, he urged, in "the footsteppes of Adam and Seth his Sonne, whose study was continuall in these thinges. . . . Abraham is renowned for his knowledge therein, and Jacob also, whose staffe we use."[32] Besides having Biblical

[31] *A Letter Apologeticall* (1599), sigs. A2v-3r, B3r & v; *General Memorials of Navigation* (1577), Advertisement to the Reader; Preface to Billingsley's Euclid (1570), sigs. A1v-2r, A3r.

[32] Sig. A4v; also B2r-3r.

precedent, astronomy, second only to Scripture, "dooth cheefely breede" the knowledge of God. It could be predicted with considerable certainty that Hood would then describe the miraculous solar eclipse at the Crucifixion—and he did. Then the usual plea that astronomy aids the interpretation of God's word. Having finished his orthodox tribute to religion, Hood went on to the much more absorbing business of showing how his science helped medicine, navigation, land surveying, farming, indeed every human calling. He did not seem genuinely to care about the broader speculations. At heart he was a specialist, most at home in the narrower rooms of study.

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A whole generation of such men was arising. Charles Turnbull, who wrote *A Treatise of the Use of the Celestiall Globe* (1585), Robert Hues, who wrote *Tractatus de Globis* (1594), Robert Norman, discoverer of the dip in the magnetic needle (*The New Attractive*, 1585), Edward Wright, author of numerous books on navigation, and particularly John Blagrave, "Gentleman and well willer to the Mathematickes," were of this stamp. The economic circumstances of England's widening trade and exploration called their work into being. It was not irreligious but non-religious. They merely took religion for granted. But this fact in itself was ominous of a future divorce between religion and the sciences, once so closely wedded. There was as yet only a practical separation from bed and board, not anything like a dissolution of the marriage in theory. But facts make theories. The quiet indifference of the scientist was to work worse mischief to religion in the long run than the conjuring of a John Dee or the blaspheming of a Christopher Marlowe. It was one of those massive, almost imperceptible movements that change the shape of the world while everybody is looking the other way.

IV

These new forces were soon to crack, if not altogether to break, the ancient peace between astronomers and divines. During most of Elizabeth's years, however, that peace continued. Behind it lay a mutual acknowledgment that the region above the moon was an

order of permanence seldom interrupted by miracles. Among the few exceptions, as Elizabethan astronomers generally agreed, was the total eclipse of the sun at the Crucifixion of Christ, since contrary to the laws of nature it happened when the moon was full. Similarly supernatural were the star that led the Wise Men to the manger and the standing still of the sun in the days of Joshua. Such exceptions might be counted on the fingers of both hands. They were chiefly Biblical; they did not (until the nova of 1572) seem to happen in the contemporary heavens. Divines could afford not to make any insistence to the contrary because, for one thing, the motions of planets and stars were obviously orderly and, because, for another, the whole topic was remote from daily life. Only when astronomy became astrology and presumed to predict the action and will of man did it earn the rebuke of the clergy.

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But the situation was quite different in the field of meteorology, which studied the elemental flux in the orbs of air and fire under the moon. This science, virtually static since the days of Aristotle's *Meteorologica*, still embraced during early Elizabethan times a wide miscellany of phenomena concerning men's daily lives in the closest possible way and stretching from comets to earthquakes, tempests, floods, droughts, all kinds of phosphorescence on land or sea, and atmospheric apparitions like twin moons, triple suns, strange gapings in the clouds, dragons flying through the air, and whatnot. These were not the distant truths of astronomy. Weather affected crops and travel here and now. Earthquakes terrified whole cities. Comets foretold the deaths of princes and the dreaded coming of pestilence. The rainbow touched the heart. Events of this kind had long seemed to the average villager or townsman the most compelling signs of God's immediate presence.

To the clergy, also, they were clear proofs of God speaking directly to the sins of mankind. Where if not here should the Christian feel awe of the divine power and assurance that the Father had a personal interest in him? While interpreting any unusual phenomenon of meteorology, therefore, divines leaned far towards the doctrine that God did not merely act by the usual course of nature to produce such calamities and portents but sometimes,

or often, departed from nature to create them miraculously. The general problem has already been considered in Chapter 5. We may stress here, nevertheless, that the position of any advocate of natural causation in meteorology was particularly difficult. He was dealing with facts highly charged with religious emotion. And his Aristotelian science, though it gave him a general theory of their nature and provenance, gave him no means of predicting specifically when any event would occur, as an astronomer could predict an eclipse. The meteorologist thus lacked the great advantage of being forehanded in his natural explanations. All he could do was to declare that God usually took the way of nature, though occasionally, or seldom, preferring to work otherwise. The field of meteors remained until nearly the end of the sixteenth century a land of fear and wonder, demon-ridden, fertile for religion and poetry, arid for science.

One senses the atmosphere immediately on taking up Thomas Hill's popular compilation and translation on the subject, *A Contemplation of Mysteries* (1571), whose very title is indicative. His preface to the gentle reader announces a purpose

> . . . to put thee in remembraunce of thy duetie to Godward: we see Gods mercifulnesse; hee seldome punisheth but sendeth before his messengers, tokens and wonders to forewarne us, if we were not dullheades, we might perceyve the same, but if we had grace, we would indevour our selves to amendment.[33]

The recent birth of monstrous animals, the unseasonable storms and floods during the past two summers, and the striking of a church by lightning, Hill reminded his audience, are warnings of God's anger. In the body of the book the physical and religious causes of each phenomenon are usually set down side by side, or jumbled together in confusion. Seldom is the physical cause given alone. The shape of a flying dragon in the clouds is said to be "ingendred of a vapour, not vehemently hote, drawne up, mightely coagulated, and pressed togither, and placed betweene a colde & hote clowde."[34] But it may also be "wrought by the pollicie of Devils, and inchantments of the wicked, as sundrie examples, doe

[33]Sig. A2v. [34]Fol. 25v.

make manifest at this day."[35] Several hundred of these beasts "having Swines snowtes" have been seen flying together. Certain cloudy effects called Parelii likewise have natural causes,

> But to the Divines or Theologically, these many tymes portende and foreshew feareful and straunge matters. . . . For as all celestiall impressions in a maner, have a certaine hid or secret signification in nature, which is not materiall: even so doe Parelii alwayes portende some singuler will and effect devine, to be looked for: so that many sunnes are sildome seene, but that eyther conspiracies be attempted, or the alteration of kingdomes, or some new matters laboured about the subversion, and disposing in religion.
>
> To conclude, the cause of these is so secret and divine, that the great conspiracies of Monarchies . . . are foreshewed by such impressions.[36]

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These samples may suffice. Clearly, even when the author did not admit that the phenomena observed were strictly miraculous, his humble awe of them as "so secret and divine" would not conduce to a close examination of their nature. Yet this was the same Thomas Hill who wrote that clean, matter-of-fact handbook on astronomy, *The Schoole of Skil* (1599), with its lucid treatment of the heavenly motions and its almost complete silence about religion. The disparity between the two books is a measure of the difference between the two sciences of meteorology and astronomy, and especially of the degree of concern religion felt about each.

Even in Hill's day, however, the Childe Roland of a reviving optical science was approaching this dark tower. Through a paradox more apparent than real, one of its first notes in Elizabethan times was sounded by that remarkable Cambridge lecturer and Puritan divine, William Fulke, in *A Goodly Gallerye* (1563). How he deflated many of the terrified popular imaginings rife in such books as Hill's emerges especially well in his treatment of the flying dragon. To Fulke it was simply a vapor beaten back from the region of cold air, set on fire, and given a serpentine shape. Crowds may see it with horror and may cry that it is the Devil himself, but "Thus do ignorant men judge of these thynges

[35]Fol. 26v. [36]Fols. 42v-43r.

that they know not."[37] Most interesting, however, is Fulke's realization that many of the weird illusions in the clouds can be explained by the science of optics "that teache howe by diverse refractions and reflections of beames, such visions are caused."[38]

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Though direct evidence is not available, Fulke seems to have been acquainted with the work being done in optics by Dee and Leonard Digges. The latter, according to the story told by his son Thomas in *Stratioticos* (1597), chanced on an old manuscript detailing experiments with perspective glasses by Roger Bacon and was encouraged to construct glasses of his own with which he was able to ignite gunpowder at a distance, scan the minutiae of objects several miles away, and so forth.[39] Recorde in *The Pathway to Knowledge* described similar glasses.[40] Dee had a whole section on optics and catoptrics in his Preface to Euclid, acclaiming with his usual scant modesty a glass which he had made, so wonderful that Queen Elizabeth herself made a special visit to see it, deceptive enough to form images in the air.[41] And Harriot was busy with

[37]Fol. 10v: "More then sixtene yeares ago, on May daye, when many younge folke went abroade early in the mornyng, I remember, by sixe of the clocke in the forenoone, there was newes come to London, that the Devill the same mornynge, was seene flyinge over the Temmes: afterward came worde, that he lyghted at Stratforde, and ther was taken and sett in the stockes, and that though he would fayne have dissembled the matter, by turning hym selfe into the likenes of a man, yet was he knowen welinough by his cloven feet. I knowe some yet alyve, that went to see hym, & returning affirmed, that he was in deed seen flying in the ayre, but was not taken prysoner. I remember also that som wyshed he had been shoot at with gons, or shaftes as he flewe over the Temes. Thus do ignorant men judge of these thynges that they knowe not..."

[38]Fol. 45r. Cf. Dee's Preface to Euclid, fol. b1r, declaring it an insult to man's sovereignty over nature to be deceived by appearances. Man should know the science of Perspective "which demonstrateth the maner, and properties of all Radiations Direct, Broken, and Reflected."

[39]Pp. 189 ff.

[40]The Preface, fol. iiiv.

[41]Sig. b1v. Writing in 1570, seven years after Fulke, Dee here showed that he had been considering the applications of optics to meteorology: "Of the Raynbow, both of his Colours, of the order of the colours, of the bignes of it, the place and heith of it, (etc) to know the causes demonstrative, is it not pleasant, is it not necessary? of two or three Sonnes appearing: of Blasing Sterres: and such like thinges: by naturall causes, brought to passe, (and yet nevertheles, of farder matter, Significative) is it not commodious for man to know the very true cause, & occasion Naturall? Yea, rather, is not, greatly, against the Soverainty of Mans nature, to be so overshot and abused, with thinges (at hand) before his eyes?"

lenses which he may have assembled to form one of the earliest of all telescopes. Unhappily, none of these greater mathematicians seems to have done much work on meteorological phenomena aside from comets, or the science of meteorology in their time would have been wiser than it was. But Fulke and possibly a few others were considering the implications of optics to pierce the superstitions that beclouded the field. And Fulke's book, while always making it clear that meteors came by the Providence of God, took a consistently rational position on their physical origins. Men in the past, he argued concerning apparitions in the clouds,

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> have taken them as immediat myracles, without any naturall meane or cause to procure them. And I truly, do acknowledge yt they are sent of God as wonderfull signes, to declare his power, & move us to amendement of life, in dede miraculus, but not yet so, yt they want a natural cause. . . . So that, as I abhorre the opinion of Epicures, to thinke that such thinges come by chaunce, but rather by ye determined purpose of Gods providence: so I consent not with them, that suppose when any thing is derived from any naturall cause, God the chiefe and best cause of al thynges is excluded.[42]

Fulke, we observe, did not think that the scientific explanations destroyed the religious. There was room for both.

V

One kind of meteor, the comet, was destined to play a special part in overthrowing the old cosmology and perhaps epitomized best the whole religio-scientific problem within the field of meteors. According to Aristotelian theory, comets were always in the earth's upper atmosphere under the moon, never in outer space above it.[43] They were composed of a fatty exhalation from the earth sucked upwards by the sun and planets, a

[42]Fol. 44r & v.

[43]Aristotle, *Meteorologica,* tr. E. W. Webster in *Works,* ed. W. D. Ross (Oxford, 1931), III, Pt. I, chaps. 6-8. C. Doris Hellman, *The Comet of 1577* (New York, 1944), chaps. 1 and 2, details Senecan and other early views opposing this predominant Aristotelian theory.

hote and drie matter, fatte, viscous, and earthly, whose partes be thicke, drawne up by vertue of the celestiall bodies, unto the upper region of the aire, where through the nearenesse of the fire, and might of the substaunce set on fire.[44]

Once ignited they burned themselves out completely, never to reappear. There was no orbit of periodic return.[45]

By nearly universal and very ancient belief, comets were divinely sent forerunners of public disasters: crop failures, pestilences, bloody battles, the fall of monarchies, and the death of kings. An elaborate scientific rationalization had been devised to explain such consequences through trains of natural causation. Comets, it was argued, could be drawn up from the earth by the celestial bodies only in seasons of extraordinary heat, and their very presence in the atmosphere then in turn intensified this heat. Such superheated air inevitably dried up crops and sickened cattle. Moreover, it made men's bodies ripe for plague by upsetting the balance of humors. Through increasing their choler it likewise inflamed their appetites for war and battle. Rebellions followed. Princes, being constitutionally delicate, succumbed first to these pernicious influences. The sequence was well set forth by John Maplet in *The Diall of Destiny* (1581):

These Comets doe prognosticate Warre, Commotions, sturres, stryfes, Treasons, and such like, because yt in the tyme of their Generation and continuance, exceding heate ruleth and boyleth in men, which Incenseth and sturreth forwards thereto, the bodyes and myndes of men. And besides this, it signifieth more especially the death of Princes and Noble Personages, for that the Ayre which then is more grosse and viscouse through the corrupted matter of ye Comet, is

[44]Hill, fol. 1r. See also John Maplet, *The Diall of Destiny* (1581), fols. 10, 35; Francis Shakelton, *A Blazyng Starre* (1580), sig. C4v; Simon Goulart, *A Learned Summary Upon the Famous Poeme of Bartas,* tr. Thomas Lodge (1621), p. 70; Fulke, fols. 14v ff.

[45]Aristotle himself, loc. cit., had discussed and rejected this possibility. It was also fairly widely known in the sixteenth century. See Fredericus Nausea, *A Treatise of Blazing Starres* (1531), tr. Abraham Fleming (1618), sig. B3r. The competition between the Aristotelian and post-Copernican views was brought out in Gulielmus Scribonius, *Naturall Philosophy,* tr. J. Widowes (1621), pp. 13-14 (1st Latin ed. in England, 1583).

not so wholsome for delicate and deliciouse Persons, as for the lusty and course Constitution of the bodyes & appetites of Labourers and Husbandmen.[46]

So ran also the common explanation in Nausea's *A Treatise of Blazing Starres* (1531) and many other works on the subject. Though not strictly astrological, since a comet was neither planet nor star, this process acted analogously upon the humors of men to produce consequences generally predictable.

The Old Heaven and Earth

On the question whether comets were miracles or merely natural warnings from God, exactly the same quarrel arose and the same divisions of emphasis came about as in the case of other meteors. Anyone interested may read the painful squirmings of Nausea's book, now proclaiming a belief in the miraculous, now hastening to add that comets have natural antecedents.[47] All through the realm of the meteors, science and religion were struggling for the initiative, and the minds of men were wrenched between them. Only on the principle that all events under the moon were links in God's universal Providence was there, as yet, rest.

The problem took on an entirely new complexion, however, when it gradually became clear to the best minds in England and on the Continent during the closing decades of the sixteenth century that comets were not below the moon but above it in the supposedly changeless heavens. Their periodicity being unproved until the age of Newton (though suspected much earlier), each comet still seemed the apparition of a few days or weeks, suddenly come and suddenly gone. Either the Aristotelian idea of immutable heavens had to be given up, or each new comet was a miracle in itself. The former of course was the inevitable final result but not until, over a period of some thirty or forty years after the 1572 nova, the alternative belief in stellar miracles had been at first greatly inflated and at last severely deflated.

[46]Fol. 36. Also Hill, fols. 3r-5r; Nausea, chaps. 8-10; Fulke, fols. 15-16.

[47]Esp. chap. 5. Also L. Bariona, *Cometographia* (1578), sig. B4, dealing specifically with the comet of 1577.

From this change of mind the astronomers themselves were by no means exempt.

Moreover, when comets were removed to vast distances in space the old scientific rationalization of their working on human affairs through heat likewise became untenable. The total effect of these two steps, taking comets out of the categories of the miraculous and of the physically causative, was to drain them of human warmth and meaning. God thereafter seemed to speak less directly to men. It became harder to believe that God made the universe specifically and exclusively for mankind. The whole doctrine of Providence lost something in immediacy. These are among the consequences of the new cosmology now to be described.

Science and Religion in Elizabethan England

8

New Cosmos

WHEN Copernicus in his *De Revolutionibus* (1543) stayed the rotating firmament of stars, lifted earth from the middle and sent it pivoting around the sun, he began a movement in thought of whose potentialities he was little aware. With the innocence of the mathematician he merely rearranged the universe in the interest of a greater mathematical simplicity, pursuing that beauty of economy which had been the desire of his Greek masters, Plato and the Pythagoreans. His guiding assumption was: the simpler, the truer. The heliocentric system with its thirty-four eccentric and epicyclic circles must be nearer the facts than the geocentric with eighty.[1]

No cosmic philosopher himself, Copernicus borrowed principles from physics and metaphysics only as required in support of the mathematics of his new theory. Thus, needing a more distant eighth sphere of stars, he immensely enlarged the universe by pushing that sphere far outward; but, not needing to say whether it had any outer limits at all, he explicitly left to philosophers the question of its infinity.[2] He also left undisturbed in

[1]Francis R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore, 1937), p. 102.

[2]Johnson, pp. 106-107. Also Johnson and S. V. Larkey, "Thomas Digges, the Copernican System, and the Idea of the Infinity of the Universe in 1576," *Huntington Library Bulletin*, No. 5 (Apr., 1934), pp. 69-117. The connection between ideas of infinity, and of other inhabited worlds, with "the principle of plenitude" is discussed by A. O. Lovejoy, *The Great Chain of Being* (Cambridge, Mass., 1936), Lect. IV. I find few references to the principle of plenitude among Elizabethan scientists and theologians. Prior continental developments from Nicholas of Cusa through Copernicus and Giordano Bruno are well covered by J. Roger Charbonnel, *La Pensée Italienne au XVIe Siècle* (Paris, 1919), chap. 5.

their places the solid spheres of Aristotle's cosmos. In these and other details he showed no rage for innovation for its own sake, certainly no religious restlessness. Yet the far-off apocalyptic consequence of the ideas sown by this pious Catholic cleric was to spread mutability upward from the sublunar to the supralunar orbs and to challenge the doctrine that man was God's favored creature for whom the whole universe was made.

I

It was, then, by revolutionizing man's ideas about his place and purpose in the universe that the new science did most to overthrow the ancient kingdoms of the mind. In England the process began neither with Robert Recorde nor with Giordano Bruno in his brief but memorable visit during the 1580's. It began with the English astronomer and mathematician Thomas Digges in the 1570's. Though he made no contribution save silence to the quarrel over Scripture, he was the first of the English Copernicans to consider how some of the long-cherished tenets of philosophy and religion could be localized in the new cosmic geography. And his solutions were not merely original and ingenious in themselves but powerfully directive of the course of later English thought from Gilbert on.

Like his predecessor Robert Recorde, whom he admired, Thomas Digges was a man of high imagination and poetic fervor, able to repeat by heart portions of Palingenius' Neo-Platonic poem, *The Zodiake of Life*. Although himself untouched by any breath of slander, he inherited from his father Leonard, the astrologer and mathematician, and from his teacher John Dee an indignation against the religious who "lacerate with their teeth the mathematical sciences," as he described them in his *Alae* (1573).[3] By these he probably meant specifically the clerical denouncers of astrology, against whom Leonard Digges had written a special preface in defense of his prognostications.[4] Or

[3]Sig. A4r of the Dedication.

[4]Preface to *A Prognostication Everlastinge,* 1st pub. in 1555.

perhaps he meant the enemies of John Dee, all and sundry. But far from being on that account anti-religious, Digges brimmed with piety which overflowed spontaneously in his scientific writings on the 1572 nova and the Copernican universe. It was, however, a piety of a rather individual brand, not humble, not directly concerned with salvation. It was a worship of God the supreme mathematician, whose high mysteries could be properly celebrated only by the mathematical initiate. Time and again in his *Alae* and his Addition to his father's *A Prognostication Everlastinge* (1576) Digges broke out in a rapture at the divine order and beauty of the new cosmos that had just swung into his ken.[5] He adjured his readers to rise "above the common sort," to throw off the beast in them that clung to the lowly earth, and soar, as God intended man to soar, into the secrets of the highest heavens. By *Alae* he meant wings, mathematical wings for the human spirit.

New Cosmos

There is no better way of bringing out the contrast between the belittlement of man's capacity and interest in the world of nature advocated by some religious thinkers on the one hand, and the aggrandizement inherent in the new science on the other, than to lay Digges' Praefatio to the *Alae* beside some of the preachments of the more otherworldly churchmen. It was instinct with pride and intellectual aristocracy. What redeemed it religiously was that the pride was a humble one at being allowed to glimpse the ineffable wonders of the deep. And its moral redemption was that the pride was in the powers of all mankind, not in the private accomplishments of Thomas Digges. Writing autobiographically in the Preface to his *Stratioticos* (1579), Digges told how in his youth he took singular delight in pure mathematics, but finding nobody to whom to communicate his work and "remembring also that grave sentence of Divine Plato, that we are not borne for our selves, but also for our Parents, Countrie, and Friends," he decided in riper years to apply his

[5]In *Alae* see esp. the Conclusio and sig. A1v of the Praefatio, declaring that only those among philosophers who scorned astronomy became atheists because, rejecting the idea of a providential organization of the cosmos, they went on to reject also the immortality of the soul. In Thomas Digges' Addition to the *Prognostication* (1576) see sigs. N3v, O3r.

mathematics to the useful arts of navigation and warfare.[6] Ethics and economics both impelled the choice.

Science and Religion in Elizabethan England

When a scientist with this kind of religious temper came, in his epoch-making Addition to *A Prognostication Everlastinge* to fit the Copernican cosmos into a Christian mold, it was only natural that the mold should burst into cracks here and there. Digges printed a diagram of the new universe, sun in the center, earth circulating with the other planets about it and, surrounding them all, the stars extending outward to infinity. This last feature was a daring departure from the hitherto accepted idea that the stars were all set fast in the curved surface of a solid sphere. Even Copernicus, while stopping the motion of the starry eighth sphere, had not definitely abolished that sphere and scattered the stars free in space. He had left that question to be debated by philosophers. Digges was not of so cautious a nature.

But what was to become of Paradise? In the old system it was immediately outside the solid primum mobile. If there was no primum mobile after all and if the stars extended infinitely out in space, some other location had to be found for the seat of the blessed. So Digges moved Paradise. He brought it down among the stars, with the description:

> This orbe of starres fixed infinitely up extendeth hit self in altitude spherically e, and therfore immovable, the pallace of foelicitye garnished with perpetuall shininge glorious lightes innumerable far excellinge our sonne both in quantitye and qualitye, the very court of coelestiall angelles devoyd of greefe and replenished with perfite endlesse joye, the habitacle for the elect.[7]

Since Digges' example associated Copernicanism in the English mind ever afterwards with the idea of an infinity of stars, and influenced the cosmologies of William Gilbert and John Wilkins,[8] its effect on Christian thought about Heaven was unsettling. For

[6] Sig. A3r.

[7] These words are placed in the diagram outside the orb of Saturn. See sig. M1.

[8] Johnson and Larkey, pp. 115-16. See William Gilbert, *De Magnete* (1600), tr. P. F. Mottelay (New York, 1893), Bk. VI, chap. 3, pp. 317-27, and John Wilkins, *The Discovery of a World in the Moone* (1638).

Digges' scheme, lowering Heaven into the universe of nature, tended to give it a nearer physical reality, more familiarity, and less wonder; hence a more distant and tenuous religious and psychological reality and a weaker hold on the pious imagination. It was another step in the same process of rationalization which was dissolving Satan out of the natural world by making him more and more natural. And with Satan, of course, went hell.

New Cosmos

Just as Digges was a good enough Christian not to dispense with Paradise but merely to change its location in accordance with the needs of his master's mathematics, so he kept unaltered the Aristotelian distinction between the incorruptible supralunar region and the corruptible sublunar elementary one, merely spinning the latter around the sun. In a passage impregnated with orthodox devoutness he wrote:

> The Globe of Elements enclosed in the Orbe of the Moone I call the Globe of Mortalitie because it is the peculiare Empire of death. For above the Moone they feare not his force. . . . In the midst of this Globe of Mortalitie hangeth this darck starre or ball of earth and water balanced and sustained in the midst of the thinne ayer onely with that propriety which the wonderfull workman hath given at the Creation to the Center of this Globe with his magnetical force vehemently to draw and hale unto itself al such other Elementall thinges as retaine the like nature.[9]

Orthodox, pious, and sensitively poetic as these words chiefly are, they yet contain the germ of strange developments to come. If the earth is a "darck starre" its kinship with the bright stars is suggested. In another place Digges said more overtly that each of the planets, resembling the earth, had a force of gravity keeping its globe from flying apart, "which kinde of propriety or affection it is likelye also that the Moone and other glorious bodyes wante not to knit & combine their partes together."[10] This was the same "magnetical force" referred to in the excerpt above. Gilbert a few years later was to expand this thought to argue the essential

[9]Leonard and Thomas Digges, *Prognostication*, Preface to the Addition, sig. M2r.

[10]Ibid., sig. O3r.

similarity of all the planets and stars to the earth as magnetic bodies. What we are witnessing is the beginning of the end of an upper region considered immutable and divine. Mutability, the giantess of Spenser's *Faerie Queene*, was rising from the earth to conquer the whole of the created universe.[11]

Science and Religion in Elizabethan England

By 1576, when Digges published his new version of the *Prognostication*, he had already completed with John Dee the important work on the 1572 nova described in Digges' *Alae* (1573) and Dee's *Parallaticae Commentationis Praxeosque Nucleus Quidam* (1573). The two men had proved, by showing the absence of a parallax, that the great new phenomenon blazing in the constellation of Cassiopeia could not be a body in the upper region of the atmosphere, where Aristotelian cosmology fixed all comets, meteors, and other transitory bodies, and must be in the supposedly incorruptible heavens above the moon. Here was a predicament. So large and glittering burned the star that it was clearly visible for some sixteen months to the naked eye of the man in the street throughout Europe, becoming a focus of both popular terror and scientific question before fading out of sight. Like Theodore Beza, many of the clergy considered it a return of the miraculous star that signalized the birth of Christ,[12] now in 1572 signalizing the approach of doomsday preceded by bloody disasters to mankind, such as the St. Bartholomew massacre in France in the same year.

Astronomers faced an alternative: either to call the nova a

[11]It was, I think, this process in terms of the new scientific developments that Spenser intended to describe in the Mutabilitie Cantos, *Faerie Queene*, Bk. VII. For similar discussions among French literary men about the middle of the sixteenth century see Frances Yates, *The French Academies of the Sixteenth Century* (Warburg Institute, 1947), chap. 5.

[12]A poem by Theodore Beza to this effect was published in Sheltoo a Geveren's *Of the Ende of this Worlde* (1577), verso of the title page, and in Alexander Gill, *A New Starr of the North* (1632), p. 9. Camden in his *Annales* (1625), pp. 319-20, seems to favor Beza's interpretation. See, similarly, Laurence Chaderton, *An Excellent Sermon* (1578), sig. F2r; John Darrell, *A Survey of Certaine Dialogicall Discourses* (1602), p. 69. Arthur Golding, a layman, seems likewise to have considered the nova a miracle: *A Discourse upon the Earthquake* (1580), sig. A4v. For other contemporary English comments read John Chamber, *A Treatise Against Judicial Astrologie* (1601), p. 18, and Christopher Heydon, *A Defence of Judiciall Astrologie* (1603), p. 124.

natural phenomenon, an instance of change in the supralunar region hitherto believed forever changeless, and thus give up the Aristotelian cosmology which it violated; or else to call it a miracle and save Aristotle. Many, of course, dodged or did not see the issue: they merely noncommittally recorded the observed facts of the nova's position, magnitude, and so on. But the intensely interesting point is that the first impulse of those who did face the issue, including some of the best scientists of the time, was to declare the phenomenon definitely a miracle. Whether this view was determined by their religious piety, or pressure of lay opinion, or Aristotelian habit must be left an open question. At all events, there seems not to have been a single astronomer in England who immediately and completely renounced Aristotle on this occasion.

In Denmark, Tycho Brahe led the way by writing that the nova "shined forth most miraculously, and contrary to the Lawes of Nature, even in the highest Firmament."[13] But God in preparing the miracle used celestial matter taken from the Milky Way with which to compact the body of the star, said Brahe. Thus he got as much science as possible into the miracle by denying that it was a creation *ex nihilo* and allowing God from nature all the materials needed for its construction. Brahe held similar supernaturalistic views of the origins of the comet of 1577 in the supralunar region, as did also other eminent continental astronomers like Michael Maestlin and Helisaeus Roeslin.

In England the differences of temperament between Dee and Thomas Digges gave a difference of tone to their respective treatments of the nova. Both men, by William Camden's account in the *Annales* (1625),[14] seem to have thought of it as descending from a higher position in the sky to its station of visibility and then gradually reascending when its time was over. To Dee in

[13]*Learned Tycho Brahe, his Astronomicall Conjecture* (1632), p. 3. This was a translation of Brahe's *Astronomiae Instauratae Progymnasmata* (1610), pp. 787-816. See also Gill, p. 7, summarizing Brahe, *De Nova Stella Anni 1572*. C. Doris Hellman, *The Comet of 1577* (New York, 1944), pp. 132, 152, 172, gives the views of Brahe, Maestlin, and Roeslin on the supernatural origins of the 1577 comet.

[14]P. 319.

the *Parallaticae Commentationis* the whole astonishing spectacle seems to have been merely an occasion for trigonometrical theorems on how to demonstrate a parallax. He did, it is true, drop a casual reference or two to "that wonderful phenomenon" (*Phaenomeno isto mirabili*) and "this Portent" (*hoc Portento*),[15] but only in passing, and he offered no real interpretation.

To Digges in his *Alae*, on the contrary, it was a chance for prolonged and eager praise of astronomy as inducing men to love God through his works. For instance, said he, anyone at all acquainted with the science would understand that the brilliant star was no vulgar comet but a true miracle "(*hoc ipsum rarissimum signum verè miraculum, Deique nuntium*)."[16] Base was the man and unworthy of a human soul who did not aspire to study that "*stupendum Dei Miraculum*."[17] Thus Digges with characteristic firmness signed himself a believer in its supernatural quality. He was never willing wholly to erase the Aristotelian line between the mutable and the immutable regions. We have already seen how he largely retained it four years later in his model of the new universe, notwithstanding other Copernican changes. Since Digges surrendered Aristotle's cosmology without compunction in other respects, the motives for his conservatism in this one were probably devotional. His case, like that of Brahe, shows how strong the doctrine of miracles still was in the 1570's, when it could make great scientists accept a supernatural as against a natural interpretation of a startling new phenomenon.

A minister like Francis Shakelton would of course concur. Writing eight years later, in 1580, he considered the comet of that year a miraculous warning of the world's end, and held the same opinion about the 1572 nova, adding that "in the judgement of the moste experte Astronomers . . . that starre which did then appeare unto our sighte, was no Comete, but mere supernaturall, directly opposite to the Starre, which appeared at the Nativitie

[15]Sig. D4r and A3r.

[16]"Praefatio Authoris," sig. A2r.

[17]"Operis Conclusio," sig. L3r.

of our Saviour Christe."[18] Shakelton advised the reader to look into Digges' *Alae*, "where the miracle is by demonstrations Mathematicall, plainly and most manifestly proved." Since he took this view, Shakelton also held fast to Aristotelian meteorology, but his coupling of the 1580 comet with the 1572 nova shows how the theory of comets was becoming connected with the problem of change in the ethereal region.[19]

II

After the nova astronomers everywhere went on the alert for other signs of alteration above the moon. Tycho Brahe and his colleagues speedily found them, or so they thought, in the comets of 1577, 1580, 1582, 1585, 1590 and subsequent years. For, discovering these comets to be outside the moon's orbit, and having no long-accumulated data to suggest each comet's periodic return, observers at first viewed the appearance and disappearance of a comet as marking its birth and death, hence the mutation of matter in the hitherto immutable quintessence. Scientific opinion in the 1590's, summarized by Thomas Hood in *The Use of the Celestial Globe* (1590), thus considered that the existence of the nova in the ether might indicate the parallel possibility of a comet's being formed there: "that starre was either newly created by Almightie God in the firmament, or els certainly it is possible for a comet to be ingendred there."[20] Hood, we notice, was not so certain as Digges and Brahe had been that the nova was a miracle.

Neither was John Blagrave, who proposed in his *Astrolabium* (1596) that the true meaning of the nova could be clarified if astronomers would join in the careful and systematic charting of the courses of all comets as they appeared, so that "posterity at the last may finde out whether there be any regularity in their motions."[21] In the minds of both Hood and Blagrave was rising the conception of a new, un-Aristotelian, natural order of change

[18]Shakelton, *A Blazyng Starre* (1580), sig. D3r. For religious interpretations of comets by continental divines see Hellman, chap. 6.

[19]See William Perkins, *Foure Great Lyers* (1585?), sig. E4v.

[20]Fol. 18v.

[21]Sig. I2r.

in the ethereal heavens, and as this rose, the conception of miracle sank correspondingly. But so far the natural and supernatural explanations still weighed fairly evenly.

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As the years went on, nevertheless, and science was able to demonstrate that comet after comet was above the moon, the belief that all of them were miracles became more and more untenable. They were too common, and too regular in their behavior. Miracles, by very definition, were uncommon and irregular. By 1618 John Bainbridge, a sufficiently pious layman and soon to be Savile professor of astronomy at Oxford, was ready to rule the miraculous virtually out of the problem, while retaining it verbally as a theoretical possibility. His observations on the 1618 comet published in *An Astronomical Description of the Late Comet* (1618) made plain his conviction that it had natural causes and a natural movement in the ether, but he felt obliged to skirt the religious interpretation cautiously:

> Those Philosophers, who still walke in the way of the Gentiles, are afraide to induce generation, or any other mutation into the heavens, rather choosing to follow their blinde guide (who denied the world to have any beginning, or ending) then to beleeve the infallible truth of sacred Scripture.
>
> Others have beene scrupulous to conceit any creation since the first Saboth.
>
> But whether this Comet and the like were caused by efficacie of nature (the ordinarie power which God hath put into all his creatures) compacting the liquid aetheriall substance, or whether by the immediate power of the worlds Architect . . . a new matter was presently created.
>
> I will not here curiously dispute; either of these waies doth acknowledge a celestiall matter, and divine providence.[22]

With the scientist's usual gesture of deference to religion, Bainbridge here quoted against the Aristotelians the text from Scripture that the heavens as well as the earth wax old as doth a garment. He also could not quite bring himself to the point of saying in so

[22]P. 24. Also Samuel Purchas, *Purchas his Pilgrimage* (1614), p. 8; John Swan, *Speculum Mundi* (Cambridge, 1635), pp. 77, 80, 106, 116.

many words that comets were not miracles. But his underlying thought was that all Christian requirements would be fully met if one supposed that the new natural order above the moon was directed by God as part of his general scheme of Providence. The features of this new order, though not yet well understood, were being explored since 1600 by the magnetic philosophy of Gilbert and since 1610 by the telescopic, mathematical, and physical discoveries of Galileo and Kepler.

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How pious the enlightened scientist still could be in interpreting comets may be judged from Bainbridge's giving the final section of his book to their "Morall application" as special portents sent by God. But this entire view of comets as divine monitors or causes of crises on earth was already being undermined by the passing of the Aristotelian meteorology in which it had become integrated. When a comet ceased to be regarded as a hot and dry exhalation drawn out of the earth, it could no longer be connected with the seasons of extraordinary heat which in turn had been thought to dry up men's bodies, increase choler, produce irritability and hence wars, with dependent consequences. Some other chain of natural cause and effect between comets and earthly actions might presumably have been invented, but by the time it was needed skepticism had progressed so far that nobody was interested enough or credulous enough to work one out. Finally when, after Halley, the return of a comet could be accurately predicted, it became no more portentous of divine meanings than the revolutions of Venus and Mars. Thus the death of this phase of the old science was the death of an associated religious interpretation which had taken it as an instance of special divine Providence.

Even after Bainbridge, however, there remained conservatives, lay or clerical, who refused to look through a telescope, who shut their eyes to all demonstrations ocular or mathematical, and kept faith in Aristotle's world. The clergyman George Hakewill, often progressive in other matters, was retrogressive in this. Of the 1572 nova he wrote in *An Apologie of the Power and Providence of God* (1627):

. . . this I take to have beene not the effect of Nature, but the supernaturall & miraculous worke of Almighty God, the first Author and free disposer of Nature; and the like may be said of all such Comets which have at any time evidently appeared (if any such evidence may be given) to be above the Globe of the Moone, from whence it can no more be inferred that the heavens are composed of a matter corruptible, naturally subject to impairing and fading, then that their motion is irregular. . . .[23]

Here, still, was the waning insistence on stellar miracles in order to save the Aristotelian cosmos, and the insistence on the Aristotelian cosmos to save the doctrine of miracles. So inseparable seemed the two concepts.

There is perhaps never any last scene of all that ends the strange, eventful history of an idea, but the death rattle of the old cosmology could be heard beginning in Bishop Wilkins' courageous book, *The Discovery of a World in the Moone* (1638). Rebutting the notion that comets above the moon were miraculous, he wrote:

> Others there are, who affirme these to be some new created stars, produced by an extraordinary supernaturall power. I answer, true indeed, tis possible they might be so, but however tis not likely they were so, since such appearances may be salved some other way, wherefore to fly unto a miracle for such things, were a great injury to nature, and to derogate from her skill, an indignity much mis-becomming a man who professes himselfe to bee a Philosopher. *Miraculum* (saith one) *est ignorantiae Asylum*, a miracle often serves for the receptacle of a lazy ignorance which any industrious Spirit would be ashamed of, it being but an idle way to shift off the labour of any further search.[24]

By these steps the definite "yes" which Brahe and Digges first gave to the miracle dwindled to a modest "either-or" in Hood, and then to a reluctant "perhaps" in Bainbridge and Wilkins. The decisive "no" was to come soon.

III

We must go back to 1600 to pick up one more fiber woven intimately into the fabric of the new cosmos in England. This was

[23] P. 74; also David Person, *Varieties* (1635), p. 7.
[24] P. 176.

Gilbert's philosophy of magnetism as set forth chiefly in Books V and VI of his *De Magnete* (1600). Like many another eminent Elizabethan scientist Gilbert had a strong Neo-Platonic and anti-Aristotelian bias which gave direction to his work. Like others of his guild, too, he united an iron intellect and powerful concentration on fact with lyricism in religious and philosophical interpretations of its ultimate meaning. Read the first four books of *De Magnete* and you breathe the astringent air of the experimental method in a purity rare for his epoch. Read the last two and you enter a dim land of myth where, as one chapter heading puts it, "The Magnetic Force is Animate, or Imitates a Soul; In many Respects it surpasses the human soul while that is united to an organic body."[25] Believing that the earth, the planets, and the stars all possessed this magnetic energy, Gilbert endued each one of them with a soul of its own and made it a living being. To this end he emphatically denied the Aristotelian view that earth was inferior to the heavenly bodies:

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> Thus Aristotle's world would seem to be a monstrous creation, in which all things are perfect, vigorous, animate, while the earth alone, luckless small fraction, is imperfect, dead, inanimate, and subject to decay. On the other hand, Hermes, Zoroaster, Orpheus, recognize a universal soul. As for us, we deem the whole world animate, and all globes, all stars, and this glorious earth, too, we hold to be from the beginning by their own destinate souls governed and from them also to have the impulse of self-preservation.[26]

So nature became for Gilbert a vast continuity of life, not a discontinuity of two regions, one mundane, the other supramundane, or one animate, the other inanimate. The seven solid spheres between the several planets and the solid eighth sphere of the stars he utterly rejected. They were no longer necessary as a vehicle of motion for the planets since each could be thought of as revolving in its orbit by the will of its inborn energy or soul. As for the starry sphere, Gilbert was enough of a Copernican to consider the stars unmoving, and enough of a Diggesian to hold

[25]Bk. V, chap. 12, pp. 308-12.
[26]P. 309.

that there was no eighth sphere whatever but, instead, a scattering of stars at varying though immense distances from the earth. To the infinity of the universe he did not in so many words commit himself, though neither did he exclude it. His chief care was to bring out the cosmic vastness and unity, the latter in the interests of raising to an equality with heavenly globes the maligned earth which in his researches he had come to admire. This unity he extended further by giving to the planets and stars elements and a system of gravity like those of the earth:

> It is evident, therefore, that all the heavenly bodies, being, as it were, set down in their destined places, in them are conglobed whatever elements bear to their own centres, and around them are assembled all their parts.[27]

Such an idea raised mutability far into the skies. Nor did Gilbert say how Paradise could subsist among fields of stars now given over to mortality.

All this clearly had not much of the specifically Christian about it and was in some respects quite heterodox. A disciple of Gilbert, the clergyman Nathanael Carpenter, later took him to task about these world souls, censuring them as a revival of Plato's heathenism.[28] The general devoutness of Gilbert's conception, however, will not be doubted by anyone reading the rhapsodic passages in which he everywhere attributed to God the glory of these creations. What apparently happened was that where Gilbert's understanding of magnetism ended his religion began. Having conducted his experiments as far as they would go, he still felt a more than metaphysical need to relate them to the whole meaning of God's universe. His Neo-Platonic studies gave him a faith in animism—other aspects of the same idea are in Paracelsus, Agrippa, even Copernicus—and he grafted it to Christianity without too much thought for its technical orthodoxy.

The magnetic philosophy thus launched had a profound influence on many English thinkers, though all its parts did not, of

[27] P. 320.

[28] *Geography* (1635), p. 12.

course, appeal to all people alike. Bishop Francis Godwin wrote between 1601 and 1610 his *Man in the Moone*, a fanciful story of a flying trip to the moon in which he omitted all reference to world souls but retained the other Gilbertian theories: that both earth and moon were magnets, that there were no solid spheres, that the moon was girdled with elements as was the earth, and that the earth rotated daily. He also took the logical next step of putting inhabitants on the moon, whom he pictured as human beings worshiping Christ. Some nice questions lay just over the horizon. If earth, moon, and presumably the other planets were inhabited, did each have its own separate revelation from God like the one imagined by Bacon for his *New Atlantis*, and were its populations all saved by Christ's death on earth? There were obvious signs of need for an expansion of narrowly anthropomorphic ideas as the human being began to look about the solar system with eyes opened to its over-all uniformity. He must now see himself also in a clearer light as a dweller on no unique globe and a possessor of no unique patent of shape or mind.[29]

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Magnetic philosophy also numbered among its adherents those two strange quarreling bedfellows, the archdeacon William Barlow and Mark Ridley, quondam physician to the Emperor of Russia. Neither of them would have anything to do with Gilbert's world souls, but they joined issue on the question whether magnetism was a force restricted to the earth, or whether it held good for all the heavenly bodies as Gilbert supposed. Ridley in *A Short Treatise of Magneticall Bodies* (1613) and *Magneticall Animadversions* (1617)[30] took the latter view; also he denied solid spheres and adopted Gilbert's ideas about the immeasurable distribution of stars through space. He did not discuss the infinity of the universe or the location of God's dwelling. Ridley was interested chiefly in science and, except in one unlucky incursion into Scripture, he let the theological chips fall where they might.

[29]Other contemporary allusions to an inhabited moon are cited by Marjorie Nicolson, *A World in the Moon*, Smith College Studies in Modern Languages, XVII, no. 2, 1936.

[30]Pp. 37 ff.

His clerical opponent Barlow, on the other hand, tried very hard to accomplish the impossible feat of being both an Aristotelian and a Gilbertian. His method in *Breife Discovery of the Idle Animadversions of Marke Ridley* (1618) was to confine magnetism to the earth and, equally, to refuse to put his eye to Galileo's telescope or credit its discoveries:

> It seemeth that mine Animadversor endeavoureth for to make shew, that he hath a stranger gift; namely, that by his very lookes (for his lookes, with his Truncke-spectacle, are his meanes) he can turne all things to be Magneticall, that hee doth earnestly behold; He hath scowred the heavens already, even from the one end unto the other, that both Planets and Stars are become magneticall in his head... it is his safest way to confine his Magnetismes unto the earth, as their naturall seat, and not suffer them to clamber up into the skies, where they have nothing to doe.[31]

Barlow was not disposed to permit any tampering with Aristotle's changeless heavens. He felt a sacrilege in it and warned Ridley to "hereafter learne to be wise unto sobriety." Earth is one kind of place; the heavens, another. Ridley and Gilbert were making the two the same, with dangers to the Aristotelian-Christian scheme.

Belief in magnetism aloft in the sky kept pace with belief in the naturalness of comets above the moon, the two moving together to a common climax in the ruin of the old cosmos. Later anti-Aristotelians like Carpenter and Wilkins held both beliefs. Carpenter thought that discovery of the satellites of Jupiter and Saturn confirmed Gilbert's theory that these planets, and their satellites too, were all magnetic bodies. On them generation and corruption occurred as on earth, without altering their "perfect sphaericitie."[32]

It is again in the work of Bishop Wilkins, however, that one sees most clearly how far the clock had moved ahead since the days of Dee and Digges. His *Discovery of a World in the Moone* (1638) proposed the idea that the moon was in effect another earth, having like it an atmosphere, land and ocean masses, and

[31]P. 10. See also Barlow, *Magneticall Advertisements* (1616), sig. B1v.

[32]Carpenter, *Geography*, p. 46.

a gravitational pull. Opposite the title page was a Copernican diagram of the universe which compared significantly with that other diagram of Thomas Digges in *A Prognostication Everlastinge*, sixty-two years earlier. Both diagrams pictured the sun at the center, and an indefinite region of fixed stars set at varying distances outside the orbit of Saturn. But the difference was that Wilkins quite omitted Digges' caption of the globe of mortality around the earth. During the intervening years the whole cosmos had become a globe of mortality, and mutability now reigned where once the unchanging spheres had rolled in their courses.

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Not blind to religious objections, Wilkins made it one of his propositions "That a plurality of worlds doth not contradict any principle of reason or faith."[33] He began with a distinction. Many people who condemned the idea of a plurality of worlds as irreligious, he said, really meant a plurality of universes, not a plurality of inferior worlds or planets, surrounded by elements, within the same universe. The former might well seem inadmissible, because Moses in Genesis did not mention the creation of more than one universe. The latter was what Wilkins championed. Such a view of multiple earths within a single universe did not detract from the unity of God, since all of them could clearly be the work of one Author. "Neither can this opinion," added Wilkins,

> derogate from the divine Wisdom (as Aquinas thinkes) but rather advance it, shewing a compendium of providence, that it could make the same body a world, and a Moone; a world for habitation, and a Moone for the use of others, and the ornament of the whole frame of Nature.[34]

Thus he was willing to accept also the habitability of the moon and other planets. To the faint-hearted who feared it "inconvenient and dangerous to admit of such opinions that doe destroy these principles of Aristotle, which all the world hath so long followed," Wilkins replied succinctly that " 'tis not Aristotle, but truth that should be the rule of our opinions."[35]

[33]Proposition 2, p. 24.
[34]P. 42.
[35]P. 30.

IV

But to what strange religious and philosophical destinations, after all, might not this truth lead? The question had begun to trouble even the scientists themselves when Robert Burton in 1621 summarized some of its implications. So huge were the stars, he said, that

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> doth Tycho Brahe in his Astronomical Epistles, out of a consideration of their vastity and greatness, break out into some such like speeches, that he will never believe those great and huge bodies were made to no other use than this we perceive, to illuminate the earth a point insensible, in respect of the whole. But who shall dwell in those vast bodies, Earths, Worlds, if they be inhabited? rational creatures? as Kepler demands, or have they souls to be saved? or do they inhabit a better part of the world than we do? Are we or they Lords of the World? And how are all things made for man?[36]

How indeed? Christianity's doctrines of the world's creation, man's sin, redemption through the sacrifice of Christ, and God's government of natural law for the providential guidance of mankind all presupposed, or had formerly been taken to presuppose, the uniqueness of the human race in this cosmos. It was man's cosmos. The change wrought by post-Copernican science which should be written down in letters of fire was the demonstration, stage by stage, that man and his habitat were not so unique as they seemed. It then became harder to accept the belief that he received from God the unique attention which Christianity had always implied.

Although these developments have been mentioned piecemeal in other contexts we should now try to view them as a whole with

[36] *The Anatomy of Melancholy*, ed. A. R. Shilleto (1896), II, 63. See also in Gilbert, p. 334, an early English recognition that the heavens cannot be supposed to revolve for the sake of the earth. Cf. Descartes, *The Principles of Philosophy*, tr. E. Haldane and G. R. T. Ross in *The Philosophical Works of Descartes* (Cambridge, 1931), I, 271: "...it is yet not at all probable that all things have been created for us in such a manner that God has had no other end in creating them. And it seems to me that such a supposition would be certainly ridiculous and inept in reference to questions of Physics, for we cannot doubt that an infinitude of things exist, or did exist, though now they have ceased to exist, which have never been beheld or comprehended by man and which have never been of any use to him."

some of their chief psychological and philosophical consequences. A first stage was the dispossession of the human race from the center of the cosmos. There could be only one center, one cynosure, and when man lost it he lost, in our usual way of prizing centricity, a badge of importance which could never be regained. He lost, too, the masterful uniqueness of immobility. Under Aristotelianism all the spheres had revolved to serve the motionless earth, but under Copernicanism the earth went into motion as an obedient satellite of the sun. And man lost not only centricity and immobility but the sole if miserable privilege of dwelling in a region of change within an otherwise changeless system of nature. Presently he found that other planets were as changeful, as well provided with the elements he had long pre-empted as his own, and apparently as habitable. New gulfs of ideas about other creatures in human or preterhuman form began to open. At the same time the cosmos grew even more immense in diameter than before, possibly infinite, and man's size correspondingly diminished.

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The thinking man was harried from another quarter by the discovery that a good many of the miracles he had been regarding as special communications to him by the Father were really parts of the order of nature and therefore not personal after all. Calling the 1572 nova and subsequent comets miracles had been a most unlucky failure. The fanfare at the beginning had been loud and universal, the later disillusionment proportionately dismal. Nobody who followed the successive stages of the doctrine's collapse in these instances could be so ready in the future to apply a like interpretation to other novelties in the physical world. When, during the next century, belief that comets and meteors had a special religious intent as omens within the order of nature likewise slowly dissolved, man's faith that the world was made for him suffered again. As shown in the preceding chapter, the Church had always relied heavily on such phenomena to keep people aware that they were at every moment under the watchful eye of the Almighty. The more usual, regular, and predictable these comets and meteors of every kind grew by demonstration of

science, the farther God seemed to retire into impersonality behind the mask of nature. He might still be thought of as guiding the entire natural system for the benefit, physical and ethical, of men. But to some minds even this idea seemed less likely as the grinding of nature's vast, precise, and ineluctable mechanisms emerged to the view of the eighteenth century after Newton. The final step down this road has been to see the mask of nature as empty of God, eyeless, devoid of any countenance.

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To this long and tragic sorites the answer already beginning to be adumbrated by seventeenth-century religious faith was that the world could still be made for man even though it were not made *exclusively* for him. Christians continued to affirm that God cherished mankind in the large, as well as every individual, though other races, other worlds, shared also the infinity of his love. The divine calculus found it possible to synchronize an unbroken order of nature with human needs of the moment, and these with yet other purposes afoot among the stars. Unassailable also remained the perpetually recurring miracle of grace, Spirit speaking to spirit by day or in the silence of the night.

In some such direction as this, surely, in some such liberalizing of the idea that God made the world for man, should lie the solutions of modern Christianity. But later developments are far too complex to be discussed with any satisfaction here. What remains is to ask how the new science affected Elizabethan faith in the infallibility of Scripture.

9

Copernicanism and the Bible

THE COPERNICAN controversy beginning in the second half of the sixteenth century was not the first to raise the issue of the extent to which the Bible should be considered a revelation of cosmological truth. As we saw in Chapter 2, an important precedent had already been set in the fourth-century dispute about the roundness of the earth and the possible existence of people on the other side of it. In their revulsion from pagan learning, including Greek science, the Church Fathers turned to the Scriptures as the supreme authority for the nature of the physical world, and found in them many texts, notably in the Old Testament books of Genesis, Psalms, and Job, which seemed to describe the earth and the heavens as flat. These were reflections of primitive Babylonian cosmogonies current in the Near East when the Old Testament was gradually being assembled during the thousand years or so before the birth of Christ. Lactantius, the least compromising of the Fathers, became to later generations the symbol of this type of scriptural interpretation, but even he, it is worth noting, used what he considered scientific reasoning in support of his position and did not rely wholly on revelation.

In time, great voices like those of Bede and Isidore of Seville made themselves heard on the other side, and it is true as a general proposition that by about the ninth century the sphericity of the earth was accepted by the better thinkers in the western Church.[1]

[1]A good summary of the whole dispute is available in J. L. E. Dreyer, *History of the Planetary Systems* (Cambridge, 1906), chap. 10, pp. 209-30. For Lactantius' views see his *De Divinis Institutionibus*, Lib. III, cap. xxiv. The sixth-century monk, Cosmas Indicopleustes, himself one of the most extreme exponents of the method of deriving cosmology from Biblical texts, quotes in Book X of *The Christian Topography*, tr. J. W. McCrindle, published by the Hakluyt Society (1897), a number of the early Fathers, including Chrysostom and Severianus, Bishop of Gabala.

What was the chief cause of this change? Not, it would appear, a conviction that the scriptural texts cited by the contemporaries of Lactantius had really meant all along that the earth was round, but rather a growing recognition that the scientific reasoning for this view was too strong to be rejected and that the Bible must be shown to conform to it for the Bible's own sake as a document revealing truth. Thus, before the Copernican controversy arose there was universal admission even among churchmen that on one important occasion a hunting of the letter of the text had led to fallacious results in the field of natural science. This, of course, was excellent ammunition for the Copernicans.

Copernicus himself foresaw that there would be objections to the heliocentric theory on Biblical grounds. And it was in order to meet these objections that Osiander wrote him a letter suggesting that he publish his findings simply as a hypothesis not possessing physical reality.[2] The great mathematician, however, preferred to seek protection by dedicating his *De Revolutionibus* (1543) to Pope Paul III and by prefixing a laudatory letter from Cardinal Schonberg. In the dedication to the Pope, Copernicus, seeking to counter the expected attack, declared, "If perhaps there are babblers who, although completely ignorant of mathematics, nevertheless take it upon themselves to pass judgment on mathematical questions and, improperly distorting some passage of Scripture to their purpose, dare to find fault with my system and censure it, I disregard them even to the extent of despising their judgment as uninformed."[3]

He then went on to make pointed allusion to the follies of Lactantius. In short, Copernicus contended that the heliocentric theory did not contradict Scripture, but he refused to argue the question. The same defensive attitude against Biblical attack, the same preference not to discuss it at all, if possible, came to be

[2] *Three Copernican Treatises*, ed. and tr. Edward Rosen (New York, 1939), p. 23.

[3] Ibid., p. 27. Copernicus' disciple, Rheticus, wrote a pamphlet, no longer extant, reconciling the motion of the earth with Holy Writ. Dorothy Stimson, *The Gradual Acceptance of the Copernican Theory* (Hanover, N. H., 1917), pp. 95-106, describes the religious resistance on the Continent.

characteristic of his followers in England. And for very obvious reasons. Such a discussion could not help them and could only do them harm. The words of Holy Writ, plainly descriptive of a primitive cosmogony, could not readily be construed to favor the heliocentric system. This system was the child of reason and observation, and had to depend upon these faculties for its justification.

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The Biblical attack in the continental countries came soon enough in the form of denunciations from the leading Protestant theologians, Luther, Calvin, and Melanchthon, all of whom condemned the new system as contrary to Scripture. It was generally banned by the universities, which were strongholds of conservative Aristotelianism, the ally of conservative theology. And the religious antagonism culminated later on, of course, in the silencing of Galileo by the Catholic Church and the placing of Copernicus' book on the *Index*.

In England, however, the theological censure was milder and never led to the outright repressions which occurred abroad. This more lenient attitude may be variously attributed to the relatively greater religious freedom in England, the native moderation and practicality of the English temperament, the existence of a strong Neo-Platonic tradition in English thought re-emphasized by Linacre, More, Colet, Tunstall, and other early humanists,[4] the relatively lesser dominance of Aristotelianism in the English universities, and other causes. Moreover, the first English Copernicans, Robert Recorde, John Dee, and Thomas Digges, were careful to infuse a strongly pious tone into their presentation of the new system by emphasizing the beauty, simplicity, and grandeur of the universe which it set forth as the work of God. Their strategy with respect to the Bible was that of Copernicus himself: to be as silent as possible about it, except to refer pointedly to the errors of Lactantius. So Recorde wrote in *The Castle of Knowledge*, first published in 1556:

[4]Discussed by Francis R. Johnson, *Astronomical Thought in Renaissance England* (Baltimore, 1937), chap. 3, pp. 82 ff.

> Manie scrupulous divines by misse-understanding of Scripture, have abhorred the studie of Astronomie, and also of Philosophie: and oftentimes doe more sharply then discreetly raile at these both, & yet understand they not any thing in either of them both. Such men are too hastie to be good judges, that will so quickly pronounce sentence, before they have any good evidence.... By some such men I may thinke that Lactantius was seduced: and the more easily, for that he had conceived a deadly hatred against al philosophers and against philosophie it selfe....[5]

Recorde, although keeping a weather eye cocked toward Scripture, never recognized explicitly that there could be any question of its disagreement with Copernicanism. Indeed his implication, if not his express statement, in the quotation just given is that the findings of science are not inconsistent with but supplementary to the Bible as rightly interpreted, and that if any apparent contradiction arises it is because the Bible has not been correctly understood. Clearly he started from science and expected Holy Writ to conform to it, not vice versa. As a matter of general practice, he kept the Bible almost completely out of his work and never cited its authority either for or against a scientific conclusion.

John Dee, another early Copernican, likewise never saw fit to argue expressly the question of the religious orthodoxy of the new theory, but presumably he believed, like Recorde, that it did not contravene Scripture. In the Preface to Billingsley's Euclid[6] he warned in general terms against such mistaken expounding of Scripture as caused men to neglect the wisdom to be learned about God through a study of his creation. Similarly, Thomas Digges in his Addition to Leonard Digges' *A Prognostication Everlastinge* (1576) gave an exposition of the Copernican system mingled with Platonism and Christian piety but without the slightest

[5]1596 ed., p. 82. William Cunningham's *The Cosmographicall Glasse* (1559), although not a Copernican work, is closely modeled on Record's treatise and imitates him in the condemnation of Lactantius and the moderns who scorn scientific discoveries "either by perverse interpreting the scripture, or els of mere follie, dispisinge that, of whiche they never tasted, & are utterly ignorant in" (p. 46).

[6]Euclid, *Elements of Geometrie,* (1570), Preface, sig. b2r.

mention of Holy Writ.[7] By all three of these men, therefore, the Bible as a source of scientific truth was virtually ignored, although they themselves would have been quick to deny that any scientific conclusions they proposed actually conflicted in any way with a proper interpretation of it.

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By about 1600, however, arguments from the Bible were being so widely applied against the new astronomy that its proponents could no longer continue to turn their heads the other way. As examples of this tendency may be cited two able popular treatises written at this time, Thomas Blundeville's *Exercises* (1597) and Thomas Hill's *The Schoole of Skil* (1599), both of which discussed the Copernican theory but rejected it for scientific and religious reasons alike. After presenting the scientific arguments, Hill then wrote:

> That neyther the earth, in right nor Cyrculare motion is drawn about the Exe tree of the world, nor about any other Exe tree, but to rest and stay in the myddle of the worlde; both holy scriptures confirme, and Phisicke reasons proove. For the Psalme sayth, which stablished the earth upon his foundation, that it shall never bee moved. And Ecclesiastes in the first chapter sayth: that the earth standeth for ever, and the sun both riseth, setteth and goeth about unto the place where he arose.[8]

This juxtaposition of scriptural and scientific argument is characteristic of most attacks on Copernicanism at this period. The attacker seldom relied on either type of argument alone. Characteristically, also, Blundeville found a way to use Copernicus' calculations by treating his system as mathematically true although physically false. By this device many other treatises which still clung to the Ptolemaic view were nevertheless able to accept Copernicus' figures, and some thinkers could take advantage of the findings of the new science without sacrificing the nominal supremacy of Scripture.

[7]See the whole of the Addition. In his *Alae* (1573), sigs. A1r & v, A4v, L2v, Thomas Digges also defended the new science from the general charge of impiety, but without contest over Biblical meanings.

[8]Pp. 49 ff. The pertinent sections of Blundeville are in Bk. II, cap. 5, fol. 183r.

Edward Wright in his Address prefixed to William Gilbert's *De Magnete* (1600) seems to have been the first English scientist overtly to defend the new astronomy from Biblical censure. After using scientific reasoning on behalf of Gilbert's system, Wright continued,

> Nor do the passages quoted from Holy Writ appear to contradict very strongly the doctrine of the earth's mobility. It does not seem to have been the intention of Moses or the prophets to promulgate nice mathematical or physical distinctions: they rather adapt themselves to the understanding of the common people and to the current fashion of speech, as nurses do in dealing with babes; they do not attend to unessential minutiae. . . . So, too, from Ps. civ. 5, no argument of any weight can, I think, be drawn to contradict the earth's mobility, albeit it is said that God established the earth on her foundations to the end it should never be moved; for the earth may remain forevermore in its own place and in the selfsame place, in such manner that it shall never be moved away by any stray force of transference, nor carried beyond its abiding place wherein it was established in the beginning by the divine architect. We, therefore, while we devoutly acknowledge and adore the inscrutable wisdom of the triune Godhead, having with all diligence investigated and discerned the wondrous work of his hands in the magnetic movements, do hold it to be entirely probable, on the ground of experiments and philosophical reasons not few, that the earth while it rests on its centre as its basis and foundation, hath a spherical motion nevertheless.[9]

Since this paragraph sums up the attitude of many men of science in the following fifty years it deserves detailed comment. In the first place, Wright was supporting Gilbert's theory of the earth's daily axial rotation, not the full Copernican theory of its daily axial rotation plus annual revolution around the sun. This compromise, like that of the Tychonic system which kept the earth motionless at the center of the universe but made the other planets move about the sun, appealed to many thinkers not only for scientific reasons but also for its easier reconcilability with Scripture.

We notice next that Wright took up the Biblical question only after a full scientific exposition and that when he did so he was

[9]Tr. P. F. Mottelay (New York, 1893), p. xlii.

distinctly on the defensive. He began from reason and observation, not from revelation. For him Scripture in this particular was a threat to be met, rather than a sure, safe, and friendly guide to natural science. His main contention with regard to Holy Writ was that its cosmological statements were adapted to the understanding of the common people and were not intended to convey accurate scientific information. This theory of accommodation was an old one, of which apologists for the new science made full use. It meant in effect the total exclusion of the Bible from any scientific discussion of astronomy. Wright, however, in his anxiety to employ every possible argument in favor of Gilbertism, went on to contend, rather contradictorily, that even literally the chief Biblical passages are consistent with it. This unwillingness to depend wholly on the theory of accommodation likewise characterizes most of the later advocates of the new science who took up the religious question. I have not met with an admission by any one of them that any specific Biblical text literally contravenes Copernicanism or Gilbertism.

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Gilbert himself in *De Magnete* showed a sweeping obliviousness of the Bible, mentioning it, I think, only once in the whole of his famous Sixth Book dealing with cosmological theory and religion.[10] This failure even to consider the question, at a time when an open incompatibility between the Bible and the new astronomy was being widely proclaimed in other books, amounts to a silent denial that Holy Writ has any place in a scientific treatise. In one other place Gilbert made an oblique acceptance of the theory of accommodation when he spoke contemptuously of the "theories adapted to the capacity of the vulgar herd or supported with sophistical subtleties" which supplanted Greek science in patristic times.[11]

Gilbert's prestige led to wide adoption of his cosmological views in England. But there were those even among the students of magnetism who were held back from such adoption by religious scruples. The clergyman William Barlow apparently was one of

[10]In a single sentence at the end of Bk. VI, chap. 3, p. 327.

[11]Bk. VI, chap. 3, p. 318.

them. In the Preface to his *Magneticall Advertisements* (1616) he stated his inability to agree with Gilbert's theory of the earth's diurnal rotation, although without actual quotation of Scripture.[12] For this rather mild negation he was furiously attacked by another student of magnetism, the physician Mark Ridley, in *Magneticall Animadversions* (1617). Strangely enough, Ridley, while giving some attention to arguments from science, laid chief stress on a bold plunge into scriptural interpretation, not in a negative but in a completely positive way, contending that Scripture in fact everywhere taught the Gilbertian rotation of the earth.[13] He is to be admired more for his courage than for his Biblical learning. Such rashness, however, is virtually unique among the contemporary scientists, who were wise enough to know where their strengths and weaknesses lay.

Typical among them is Nathanael Carpenter, a moderate divine, who in his *Geography*, written in 1625, also showed himself an able exponent of the new science. Obviously he was convinced by Gilbert's doctrine of axial rotation, but enough recognition of the theological difficulties remained to cause him to present it as merely probable, leaving the reader to make up his own mind about it. He wrote: "I confesse this opinion of the Earths circular motion to be subject to many & great exceptions, and opposed by strong and waighty arguments drawne probably from the booke of God, the touchstone of sincere verity; yet I hold it too strongly fortified to be invaded by popular arguments drawne from seeming sense, and bolstered up with names and authorities."[14]

Carpenter's method, then, was first to expound in forceful detail the scientific arguments for the new cosmology and next to take up the alleged scriptural objections. Clearly he was on the defensive here. Where he saw a way to give a text a literal interpretation

[12]Sig. B1 v. In his reply to Ridley's attack upon him, however, Barlow later advanced scriptural passages against the earth's mobility and indeed leaned chiefly upon them. See *A Breife Discovery of the Idle Animadversions of Marke Ridley* (1618), pp. 5-6, 9-10. On p. 8 Barlow took the position that the Copernican system had been proposed by scientists merely as a hypothesis.

[13]Pp. 5 ff.

[14]P. 76.

consistent with Gilbertism he did so.[15] When, on the other hand, he was frank enough with himself to realize that the language could not fairly bear any such meaning, he covered the discrepancy with the theory of accommodation, saying that the Holy Ghost was here merely speaking to the apprehensions of the vulgar.[16] In another work, the *Philosophia Libera* (1622), he declared in so many words that he rejected Ptolemaism for scientific reasons and Copernicanism for theological, choosing the middle ground of Gilbertism, which was not open to objection on either score.[17] The potency of Scripture to help throw forward-looking men into a position of compromise is here well exemplified. It seems to have weighed with Tycho Brahe himself in his refusal to go all the way with Copernicus.[18]

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Yet there were, even among the divines, a considerable number who were willing to accept the whole of Copernicanism, just as there were others who clung absolutely to the Aristotelian-Ptolemaic universe. These extremes opposed each other in the Wilkins-Rosse controversy.[19] Bishop John Wilkins was a liberal divine, an outright Copernican, one of the founders of the Royal Society, whereas Alexander Rosse set himself against all the new tendencies in thought and religion. Both men used what they considered arguments drawn from science as well as arguments drawn from religion, with perhaps somewhat greater emphasis on the latter.

Wilkins, like his predecessors, resorted not only to the theory of the accommodation of Biblical passages to ignorant minds but also to an attempt to show that no text cited by his opponent was really adverse to the Copernican view.[20] However, he entered a general protest against too literal interpretation and made much of the errors resulting from it in the Lactantius episode. The value

[15] See pp. 95 ff.

[16] E. g., p. 96.

[17] (Oxford), p. 272.

[18] Dreyer, pp. 360-61.

[19] See John Wilkins, *The Discovery of a World in the Moone* (1638) and *A Discourse concerning A New Planet* (1640); Alexander Rosse, *The New Planet no Planet* (1646) and *Commentum de Terrae Motu Circulari* (1634).

[20] *The Discovery of a World in the Moone*, pp. 35-38; *A Discourse concerning A New Planet*, pp. 11-13, 28 ff.

of this precedent to the Copernicans shows very clearly here. On the contrary part, Rosse of course stayed close to the literal meaning of the words of Scripture and argued that this was the only one applicable. With regard to the theory of accommodation he retorted rather cogently that it would have been as easy and as intelligible to the people for the Holy Ghost to say that the earth moves as to say that the sun moves. The Bible, he argued, never tells a palpable lie about any fact in the physical world. Nevertheless, Rosse was considerably embarrassed by his inability to stick to the letter of the text in some passages like those describing the windows of heaven, the four corners of the earth, and the flatness of the earth.[21] Even he had to admit that the Fathers had erred there.

The underlying discrepancy between the two churchmen appears plainly in the two following passages. Wilkins wrote:

> It were happy for us, if we could exempt Scripture from Philosophicall controversies: if we could bee content to let it bee perfect for that end unto which it was intended, for a Rule of our Faith and Obedience; and not stretch it also to be a Judge of such naturall truths, as are to be found out by our owne industry and experience. Though the Holy Ghost could easily have given us a full resolution of all such particulars; yet hee hath left this travell to the sonnes of men to bee exercised therewith. . . .[22]

To this, Rosse retorted:

> . . . neither is it unlawful to conclude Philosophicall points from the letter of Gods word, seeing there is but one truth in Divinitie and Philosophie. But to conclude Philosophicall points flat contrary to the letter of divine Scripture, as you doe, is too much boldnesse. . . . It were happy for us (say you) if we could exempt Scripture from Philosophicall controversies. And I say, It were happy for us, if all Philosophicall controversies could be decided by Scripture; or if men would be so modest, as to rest contented with Scripture phrases, and expressions of such Philosophicall points, as are mentioned there. . . .[23]

[21] *The New Planet no Planet*, e. g., pp. 45-46, 55.
[22] *A Discourse concerning A New Planet*, p. 28.
[23] *The New Planet no Planet*, pp. 11, 13.

The opposition to the new astronomy on theological grounds reached its peak in this controversy. It is symptomatic that the champion of science, no less than its adversary, was a churchman. There never was in England any united front by the clergy against the new knowledge. On the contrary, many of its warmest proponents and some of its ablest practitioners were men connected in one way or another with the Church. As the years went on, as the proofs of the Copernican system accumulated and the minds of men had time to weigh them, the theological opposition melted away. It became more and more obvious to the theologians that they were doing no service to the Bible by insisting on its disagreement with a view now so generally acceptable to the human intellect. Thus once more, as in the days of Lactantius, reason and observation obtained the victory over a narrow interpretation of revelation in the field of natural science. It would have been better for religion and better for science if the theory of accommodation had been accepted once for all and if it had been generally admitted that the Bible taught only the truths necessary to salvation, not also the facts of the physical world. But literal interpretation lived on to fight another day in the controversy over the evolution of the earth and of man.

Copernicanism and the Bible

The foregoing brief survey makes it possible to set down some tentative generalizations for the period covered. The new astronomy met considerably less religious opposition in England than on the Continent, many of its prominent advocates being, in fact, divines of unimpeachable orthodoxy. Nonetheless, a number of thinkers who rejected the Aristotelian-Ptolemaic universe felt constrained by theological no less than by scientific reasons to stop short of outright Copernicanism and to embrace instead the Tychonic or Gilbertian systems, which were more easily reconcilable with Holy Writ. This issue of Biblical interpretation was largely ignored in astronomical treatises until about 1600, when scientists evidently believed it had grown to such proportions as to require an open answer. Then the answer was made partly on the general ground that in cosmological matters the Bible intended only to speak in popular terms, not in accurate scientific terms, and

partly on the ground that any specific text could be satisfactorily construed into consistency with the new science. It is abundantly clear, however, that the scientists were much on the defensive against Scripture, that they considered it only because they felt they had to, and that they regarded reason and experiment, not revelation, as the true source of natural science.

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The opposition, for its part, did not rest its case simply on literal Biblical interpretation but on scientific reasoning also. Hence a conflict between the new science *alone* on the one hand and Scripture *alone* on the other was seldom sharply focused. And the antagonism to the new science even on a basis of scriptural interpretation was itself embarrassed by the inability of the fundamentalists to be completely fundamental, since they had abandoned literal interpretation in previous controversies about the flatness of the earth. In the long run, the Biblical issue may have delayed somewhat the general acceptance of the new science, but it could not affect the final outcome. What really decided the outcome was, of course, the dynamic advance of science, with its power to convince the minds of men about all facts concerning the physical world.

10

Astrological Fate

I

TODAY we may smile wryly at astrology, but in the eyes of the Elizabethan and Jacobean clergy it was a graver menace than Copernican astronomy. Copernicanism, in so far as it was a religious error at all, was a recent error of the few, whereas astrology had tyrannized over the hopes and fears of nobleman and commoner alike since remote antiquity. Furthermore, the Copernicans at least did not meddle with the deeds of men. But judicial astrology presumed to predict all the happenings of life from the cradle to the grave and often looked suspiciously like a rival of religion contending for the emotional loyalty of mankind. In fact it involved a doctrine of materialistic determinism which challenged the whole Christian concept of man's reason and will. So any theologian writing or preaching on the subject was likely to erupt into condemnation.[1]

In this spirit Bishop James Pilkington decried the idea that the stars could make some days lucky and others unlucky,[2] Bishop John Jewel objected to prophecies setting the term for the world's end,[3] Gervase Babington quoted the Old Testament against star-

[1]For general works on Renaissance astrology see D. C. Allen, *The Star-Crossed Renaissance* (Durham, N. C., 1941) and Thomas Tomkis, *Albumazar*, ed. Hugh Dick (Berkeley, 1944). Both have been useful in the preparation of this chapter. Cf. esp. for the continental thinkers Ernst Cassirer, *Individuum und Kosmos in der Philosophie der Renaissance* (Leipzig, 1927), pp. 103-27; and for medieval antecedents Theodore O. Wedel, *The Mediaeval Attitude toward Astrology* (New Haven, 1920).

[2]*Exposition upon the Prophet Haggai* in *Works*, ed. James Scholefield (1842), Parker Society, XXXV, 1.

[3]*Upon the First Epistle to the Thessalonians* in *Works*, ed. John Ayre (1845-50), Parker Society, XXIV, 872-73.

gazers,[4] and Roger Hutchinson and Andrew Willet showed how a man could ruin his faith and morals if he kept forever "tooting on the stars."[5] More revealing still, of the six full-scale polemics published in England against astrology in the Elizabethan age, five—those by William Fulke, John Calvin, William Perkins, John Chamber, and George Carleton—came from ecclesiastics.[6] The sixth, Henry Howard's *A Defensative against the Poyson of Supposed Prophecies* (1583), had a chiefly political motivation. No less significant was the almost unanimous outcry against astrology by the authors of the books on witchcraft and wizardry. Most of these men, like Gifford, Holland, Mason, and James I, were either theologians themselves or disciples of the theological tradition. To their way of thinking, astrologers were either charlatans or sorcerers, children of the devil in either case. There is no escaping the conclusion that the array of the Elizabethan clergy against divination by the stars was almost unbroken.

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And who, on the other side, spoke up for astrology? To the bewilderment of the modern analyst, chiefly the foremost scientific men of the age. One might think offhand that these veterans of nature's wars would have pierced easily into the hollowness of this pretender to science. Yet, except for one or two stray divines like Richard Harvey and John Maplet who had strong scientific interests, the apologists for astrology were an almost solid front of physicians, astronomers, and other natural philosophers, renowned for their achievements. In 1560 William Fulke remarked that "the moste parte of Astrologians ar by profession phisitions."[7] A look at Bosanquet's bibliography of the almanacs and prognostications then being printed shows how right he was.[8] A consider-

[4] *Certaine Notes upon Genesis* (1596), p. 14.

[5] Andrew Willet, *Hexapla in Genesin* (1605), p. 10 ff.; Roger Hutchinson, *The Image of God* (1550), fol. lviir.

[6] William Fulke, *Antiprognosticon* (1560); John Calvin, *An Admonicion against Astrology Judiciall* (1561); William Perkins, *Foure Great Lyers* (1585?); John Chamber, *A Treatise against Judicial Astrology* (1601); George Carleton, *The Madnesse of Astrologers* (1624; written ca. 1604).

[7] Sig. D7v.

[8] *English Printed Almanacks to the year 1600* (1917), ed. E. F. Bosanquet, for the Bibliographical Society.

able majority of the authors were medical men of high reputation, among them William Cunningham, Robert Watson, and Gabriel Frend. Corroboration comes also from Richard Harvey, who, feeling that as a divine he needed some special justification for tampering with prophecies about the coming conjunction of Jupiter and Saturn, looked about him for religious precedent. He was forced to rely mostly on Melanchthon,[9] and when he sought English names he could find only scientists:

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> To let strangers go, these of fresh memorie have bene none of the basest scholers in England: *M. D. Buttes* principal Phisition to king *Henry* the eight. Sir *Thomas Eliot*, Sir *Thomas Smyth*.... *M. D. Recorde*, both the *Digges*, *M. Dee*, whome hir majestie vouchsafeth the name of hyr Philosopher: *M. Securis*, *M. Buckmaster*, *M. Mounslowe*, *M. D. Twyne*, besides most of our chiefe doctors in Phisike, as namely our *M. D. Baro* in Cambridge, and *M. D. Foster* in London, and some of our very chiefest Philosophers in either Universitie....[10]

Harvey was right. These were "none of the basest scholers in England" but the most illustrious leaders of astronomy and medicine. Contrariwise, not one of them was a divine. And had Harvey been writing twenty years later—the passage quoted was penned in 1583—he could have added such other prominent scientists as Thomas Hood and Francis Bacon as at least partial proponents, without at the same time being able to bring in any important new English ecclesiastics. At first glance it looks as if the clergy and the scientists were confronting each other across a precise line of division, one indeed more precise and estranging than was the case in any other phase of Elizabethan science. In medicine, in psychology, in astronomy, a cohort of churchmen was to be found on either side of the fence, and often there was no fence at all. But not so in astrology. The dispute seemed to them to hinge too clearly on the supremacy of God over matter and the supremacy of the

[9]Melanchthon's letter to Simon Grynaeus defending judicial astrology, one of the most eminent defenses by any churchman, was widely cited by English astrologers: Richard Harvey, *An Astrological Discourse* (1583), the Dedication; Leonard Digges, *A Prognostication Everlastinge* (1576), fol. 11; Thomas Bretnor, *Almanacke* (1617), Address to the Reader.

[10]*An Astrological Discourse*, p. 5.

human will over the body; in short, on the impiety of materialism.

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Yet divisions are seldom as crisp as they seem, and this one was in part illusory. Like other shibboleths in other periods, astrology meant different things to different people. When a medical man came out in defense of astrology he might and undoubtedly sometimes did mean merely that he had no doubt of the power of the planets over the humors of the body, without implying any wider belief in their power to make a man rich, give him a beautiful wife, win him a title at court, and all the rest of the things usually predicted in horoscopes. With this moderation the clergyman heartily agreed. Yet if they both kept talking vaguely about "astrology" and the efficacy of the stars to "incline but not compel" they might find themselves embroiled in the shadows of words. Similarly, when the clergyman came out against astrology he might be thinking only of its attempts to set a day when the world should end or to foretell whether John Doe would turn out to be a good or a bad man. Yet if he did not say exactly what he was thinking, the astronomer, who thoroughly shared these views, might suppose he was denying all terrestrial influence of the heavenly bodies. One cannot help being both irritated and amused to see how many of these contests over astrology would have evaporated if the parties had only stopped long enough to make a clear definition of the issues in each case. What, then, were these issues?

Judicial astrology, as everyone admitted, was more than a bare description of the celestial motions, more than pure astronomical theory. It applied the findings of that theory to the practical business of predicting results here on earth. Everybody could agree also that the heavens did energize in some respects the earth's atmosphere and the physical conditions supporting life. The sun's heat set in motion the cycle of transmutation of the four elements, created winds, dew, and rain, fertilized with warmth and moisture the seeds of plant and animal life, nourished human existence, and so forth. All this was good Aristotelian science and not judicial astrology. Nor was a knowledge of the rotation of seasons, nor the farmer's day-to-day forecasts of weather from natural signs, nor the physician's prognosis that bronchial diseases abounded in win-

ter more than in summer.[11] But as soon as almanacs presumed to make long-range predictions for weather and sickness during each day of the ensuing year they entered the arena of controversy.

Similarly, there could be no cavil against foretelling the waxing and waning of the moon, with its altering pull upon the tides. Somewhat more controversial but still widely agreed upon was the lunar influence over all the moisture in man's body, including the humors which determined health or sickness.[12] The moon's position in relation to the signs of the zodiac and to the other planets helped to fix, especially, the safe or necessary times for phlebotomy and purgation. And since these methods of therapy were standard for getting rid of any excess of humor which was causing a disease, most thinkers admitted that the doctor had to know something about this phase of astrology.[13] One should add that most medical books stopped here and did not go on to the highly complex procedures for diagnosing and prognosing disease by means of the stars, recommended in such a book as John Fage's *Speculum Aegrotorum* (1606). Even less, of course, did they concern themselves with any of the non-medical theories of astrology. Hence the extent to which physicians subscribed to such theories is very hard to gauge. By and large, the likelihood is that there was a considerable carry-over from their beliefs in astrological medicine to the wider ranges of astrological prediction. Certainly doctors like William Cunningham and Thomas Bretnor who published almanacs followed this line. And, by analogy, such notable astronomers as John Dee and Leonard Digges moved easily from stellar system to stellar influence.[14] Still, the transition was not in-

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[11]Carleton, pp. 48, 71-72; James I, *Daemonologie* (1597), p. 13.

[12]Perkins, sig. D5v, contra.

[13]For examples of the use of astrology in medical and surgical works see Simon Harward, *Phlebotomy* (1601), pp. 92-97; Nicholas Gyer, *The English Phlebotomy* (1592), p. 180 ff.; Andrew Boorde, *The Breviary of Healthe* (1542?), fol. 4r; Thomas Phayre, *The Regiment of Life* (1596), sig. L3v-4r; Peter Levens, *The Path-way to Health* (1632), fol. 62r; Peter Lowe, *Chirurgerie* (1597), sig. Cc2v; Thomas Moulton, *The Myrrour of Helth* (1550?), sigs. B3v ff.

[14]See *The Private Diary of Dr. John Dee*, ed. J. O. Halliwell-Phillipps (1842), for the Camden Society; and Digges, Preface.

evitable, and we should be cautious about supposing that it was always made.

So far the area of agreement about what was legitimate astrology has been seen to cover the higher generalities of solar and lunar regulation of climate, tides, plant life, the human physique, and the like. Dispute broke out as soon as the astrologer tried to say specifically what was to happen at certain times to certain regions, nations, or individuals. And the more specific he became, the more intense grew his opposition. If he simply said broadly that comets and planetary figures brought plague, famine, war, the death of princes, and the overturn of monarchies he was reciting a commonplace that attracted not only little opposition but little interest.[15] If, like Richard Harvey, he narrowed down the prediction to world-wide disasters foreshadowed by the conjunction of Jupiter and Saturn in 1583 he aroused more interest and more enemies. If he closed it down still further and was rash enough to name names of people and places to be affected, he provoked immense interest and corresponding hostility, both political and religious.

Likewise, turning from public to private forecasts, the astrologer who merely classified a client as belonging to a certain psychological type because of his birth under one or other of the seven planets might be looked at by the clergy with a somewhat jaundiced eye, but not nearly so much as was the caster of horoscopes who laid open in detail the physical and moral qualities of his client together with a minute recording of his fortunes in all the days to come. The more specific, the more presumptuous against man's free will and God's Providence. And, further, the more scientifically dubious. For in his more concrete prognostications the astrologer had to compute not only the familiar motions and effects of sun and moon, but also far more intricately those of the other five planets, the twelve signs of the zodiac, the manifold constellations of the fixed stars, and the whole complex theory of aspects, houses, and the like. He had, that is, to find an infinite number of different sidereal combinations to account for the infinite differ-

[15]The orthodox view is stated, for example, by William Covell, *Polimanteia* (1595), sig. H2r.

ences in men's natures and fortunes. Thus the more specific he became the more fantastic were his calculations, and the more repugnant to a critical intelligence. At the same time they also became increasingly offensive to religion in that they implied a necessarily more and more mechanistic interpretation of the nature of the world and of man. For the longer the chain of causation behind the specific event, the less room could the astrologer allow for variation in each of its antecedent links. So the scientific criticism of elaborate stellar figuring and the religious criticism of the specific prediction neatly coincided, and it became possible to assail astrology on scientific and religious grounds concurrently.

Astrological Fate

II

As already hinted, the dilemma of astrology was that it could never escape from the specific. This was its very *raison d'être*. It had been born of the pathetic human need to probe the dark stream of the future, to find some palliative for the anxieties which beset daily life. When Nan, Mary, or Meg rapped on the astrologer's door, she came not to hear about the stars as universal causes but to ask what lay in store for her, whether she was to inherit that pewterware from her aunt, find the ring she had lost, or marry the handsome stranger who had been eying her lately. The noble lord who summoned the astrologer to his castle to cast a horoscope for his new heir did not happen to be interested in a calculus of probabilities larded with 'ifs,' 'buts,' and 'maybes.' He demanded positive information about the boy's education, marriage, and career. Astrologers with an eye to the day of reckoning when their predictions must stand revealed as false or true might try to insert a cautious condition, an enigmatic evasion, but if they put in too many they risked losing the client to some bolder competitor. Inevitably the professional stargazer gave what was expected of him, in the most resolute language he could command. And this was the specific and the unconditional.

Ptolemy's *Compost* minced no words in declaring that "The man that is borne under Saturne, shalbe false, envyous, and

full of debate," whereas he who arrives under Mercury will love to "talke Phylosophy and Geometry, he shall love well wrytynge & to rede ever in straunge bokes. . . ."[16] No 'ifs' about it. Other ironclad psychological types are in like manner produced by the other planets. Only at the end did Ptolemy think to add that a man has the liberty to get out of his type by an effort of the will.

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John Maplet's *Diall of Destiny* (1581) had the same highly deterministic tone.[17] And Auger Ferrier's *Learned Astronomical Discourse of the Judgement of Nativities* (1593) made astrology the most exact of sciences. It calculated horoscopes to show whether a newborn infant shall or shall not survive, the moral and mental qualities with which he will be endowed, the number of brothers and sisters he will have, the length of life of his parents, the diseases that will afflict him and when, the date and manner of his death, the shape of the eventualities of his life, all down to the tiniest detail.[18] The certitude of the whole performance was solemn and complete. Ferrier never troubled himself to mention that all these happenings were contingent on other variables, or dependent in any way on God's will. If this was the language of astrology in action, no wonder the clergy found it arrogant and sternly fatalistic.

The typical astrological almanac, however, was not so extreme. Thomas Hill's *Almanack* for 1571 is worth taking as a specimen of the norm. It begins with a table of the nature and quality of each of the twelve signs of the zodiac. Aries and Taurus, for example, are hot and dry, fiery and choleric; Leo and Virgo cold and dry, earthy and melancholic. Then comes a discussion of "Convenient times, concerning the xii signes, to graffe, sowe, and plant in." Then a calendar for the year, indicating the feast days and the dominant zodiacal sign for each day. Next a table for the changes of the moon month by month with a weather prognostication for each of the four quarters in each month. Under "A demonstration of the nature, disposition and qualities of the seaven Planets" each planet is given a four-line description telling whether it is evil or

[16]*The Compost of Ptolemaeus* (1540?), sigs. M3r, N4r.

[17]Esp. the Preface and fols. 13v ff.

[18]Esp. fols. 8v, 13r, 18r & v, 23r.

good, what parts of man's body it governs, and what psychological traits it instills. The latter are stated in general terms without qualifications as to human or divine will. Then follow "Certaine necessarie observations, touching the Rules of Phisick" outlining rules for purgations and phlebotomy according to the dominance of moon and signs. Last is a short general description of types of weather and diseases to be expected in each of the four seasons of the year.

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Scores of other almanacs and prognostications much like this were published all through the Elizabethan period.[19] Manifestly they were far less exposed to either religious or scientific objection than were individual horoscopes. Almanacs, being issued for public sale, were of necessity restricted fairly well to the general, away from the curse of the specific. Nevertheless they rested on the same chief premises and were assailed by William Fulke and others.[20] Before considering the grounds of that assault, however, we shall do well to hear what the astrologers had to say for themselves.

Their grand objective, the principal aim of their whole strategy, was to prove that astrology was a true physical science.[21] Sir Christopher Heydon in *A Defence of Judiciall Astrologie* (1603) labored at this with his right hand while fending off religious criticism with his left. He opened with a definition of astrology designed to achieve both ends:

I define *Astrologie to be that Arte which teacheth by the motions, configurations, and influence of the Signes, starres, and celestiall Planets, to Prognosticate of the naturall effects, and mutations to come, in the elements and these inferiour and elementarie bodies.*[22]

[19]E.g. Lewes Vaughan, *A Newe Almanacke and Prognostication* (1559); William Cunningham, *A New Almanack and Prognostication* (1564); Robert Watson, *Doble Almanacke for 1600*; etc. Even more innocuous were the so-called 'reformed' or 'Christian' almanacs described by Chamber, p. 2, and derided by Bretnor, *Almanack for 1618*, Address to the Reader.

[20]Fulke, sig. B1r.

[21]This is one of the chief points made by John Harvey, *A Discoursive Probleme concerning Prophesies* (1588), pp. 76 ff.

[22]P. 2. Heydon, it may be added, knew much more about astronomy than did any of his clerical opponents and was well up on recent Copernican developments.

The stars and planets, he repeated, affect climate by exactly the same natural means as do the sun and moon. They likewise affect human action only through their power over the matter of the body.

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How does this process work? Each planet, sign, or star has its own special quality and impresses it on the body which, at birth, it dominates. It works through the natural humors. These in turn produce in each person a certain tendency of the passions, and this goes on to influence the mind:

> Wherefore though the heavens cannot be said to enforce: yet there is nothing more certen then that they incline, according to the natural constitution, which we have from them, sith the soule exerciseth the faculties thereof, by the Organicall parts of the bodie: & for the most part desireth and judgeth perfectly, or imperfectly, as the parts and forme of our bodies is well or evill tempered. Proofe hereof we see in the *Lunaticke*, whose distemper (as experience doeth teach, and as all Phisitions with one consent confesse) followeth the course of the Moone.[23]

By this route a man becomes predisposed to evil or to good. For, if a baleful planet stimulates vicious passions through corrupted humors, they besiege the will and usually overcome it. The will, it must be understood, remains free to resist and choose the nobler path, but usually "the most part of men doe follow their affections, and there are but fewe that doe master and overrule them."[24]

Here was the cardinal fact that permitted prediction, not a certain and infallible prediction to be sure, but at least a probable one. And here also, we may interpolate in passing, was the dangerous claim which the religious opposition had to refute in order to maintain the freedom of the will. The astrologer said that he merely assessed the probabilities imposed by the stars at a man's birth, and on that basis could forecast what he was most likely to do. And all this in consequence of a perfectly natural train of cause and effect working through his body. True, astrologers made mistakes, but so did doctors in their prognoses or astronomers in their predictions. Astrology was as much a science as medicine or astronomy.

[23]P. 154; summarized also by Perkins, sig. E6r.

[24]P. 86.

In fact, it was a legitimate part of astronomy. So ran the plea for the defense.

This was the plea which boldly slashed away from the body of astrology everything not susceptible of explanation in terms of natural law. With equal boldness clerical antagonists met the astrologer on his own ground. They, too, were quite willing to subject astrology to the test of natural science, and in so doing gave an important exhibition of how thoroughly at home the religious mind of the period could be among the basic philosophical postulates of science. And this in spite of the fact that the chief animus of their denunciations remained religious and that they mingled the argument from God with the argument from nature.

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III

Drawing many of their arguments from the attacks on astrology published on the Continent by men like Pico della Mirandola and Perrerius, the clergy went to work not only by challenging every step in the long progression of causes which the astrologer tried to set up between the stars and the event but also by challenging the initial assumptions. How can astrologers know, asked William Fulke in his *Antiprognosticon* (1560), that one planet is more malicious or benign than another, or that a trine aspect is more favorable than a quartile, and so on?[25] Who told them? Such notions were certainly not revealed by God, nor is there any possible way of discovering them by observation. Ergo they are pure human fictions. This is particularly true of the signs of the zodiac, which are only mathematical conveniences and have no real existence whatever.[26] "We dare be bold to affirme," Fulke declared,

> That this is common to all sciences, that they may bee demonstrated. For although the principles and grounds in every arte, be of suche nature, that they canne not bee shewed and confyrmed by things more general, and therfore it is said, that they can not be proved,

[25]Sigs. B3r ff., D5r ff.

[26]Henry Howard, *A Defensative against the Poyson of Supposed Prophecies* (1583), sig. P3v.

yet by demonstration or induction they maye be so playnly sette before our eies, that no man neede to doubte, but that they are moste true and certain. . . . But by no waie is it possible, that the principles of this arte of Astrologie, may be either demonstrated or proved. Ther is no mean wherby mans witte may atteyne to so greate knowledge, ther is no methode, no induction, yt can maintayn truth of these propositions, whyche they take for their principles.[27]

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Since the pseudo-science lacks any foundation in fact, no one need be surprised that not one quarter of its predictions come true.

Other clerics busied themselves in pointing out that even supposing the stars to have some kind of influence, its nature and operation are bound to be uncertain. To begin with, said John Chamber, many stars shine too far and faint to be seen by the astrologer.[28] Their unascertained rays may well ruin his calculations altogether. Nor has astrology proved that the heavens are the *only* factors at work in forming life, whether vegetable, animal, or human. On the contrary, heredity makes a far greater contribution than the firmament.[29] The seed of mother and father, contended John Calvin, "have in influence and vertue of an hundreth folde more power than hath all the starres together."[30] Besides, God may always contribute a special grace. And although the constellations may "emprinte certain qualities in the persons . . . they can not cause that this thing or that shuld fall upon them afterwarde of other occasions." Each man's life does not lie wholly within his own control but is molded by hundreds of other men. One man's horoscope cannot envision what these others will do to him. Thirty thousand men born under different stars may all die in the same battle, and twins born under the same star often undergo fortunes most dissimilar.[31]

All these objections and many others like them were aimed at showing either that the stars were not causes at all or that, if they were, they shared control with many other variables too uncertain for prediction. Henry Howard summed up the general principle:

[27]Sigs. B2r & v, B3v; Howard, sig. R3r. [28]P. 16.

[29]Augustine, *The City of God,* Bk. V, chap. 2; Howard, sigs. O3r ff.; Chamber, pp. 26, 71, 125 ff.

[30]Sigs. B2v, B5r. [31]Augustine, loc. cit.; Pilkington, p. 18.

It is an easie matter I confesse to devine by causes, which by course of kind are lincked and combined to theyr determined, perticuler and infallible effects, what is lykest to betyde: but to gesse a far off at a matter, what shall come to passe by mean of divers middle causes intercurring, which are loose, dislincked, and not any whit according to them selves, is as if a man woulde take uppon him . . . by staringe on the steeple of a parish church, to tell what kynd of people pray within the same . . . which strict and narrowe circumstances, being but conceived in the private thoughts . . . without demonstration, as all Philosophers confesse, can not be warraunted by certainty.[32]

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If the astrologer then retreated to the empirical argument that experience has shown over the centuries the same stellar conjunctions and conformations always to have produced the same results, both Howard and John Chamber replied that the face of the heavens was never precisely the same for two moments together during the whole 36,000 year cycle of the magnus annus.[33] No two men ever were born under identical celestial figures. Hence, there could be no accumulation of homologous data to serve as material for the generalizing of a sound scientific law. Nor did it follow that merely because an earthly event accompanied a particular figure in the heavens therefore the former caused the latter. "For in those thinges which happen together," said William Perkins in *Foure Great Lyers* (1585?), "the one is not the cause of the other."[34]

The Elizabethan debate culminated just at the end of the reign when John Chamber's *A Treatise Against Judicial Astrologie* (1601) was answered by Sir Christopher Heydon's defense, which in turn evoked George Carleton's rejoinder, *The Madnesse of Astrologers*, written in 1604. All three were able men, but Carleton especially was one of those rarer beings whose mind was a prow of light scattering darkness like a sea. He was ready to concede that the stars may be universal causes. They may even incline the humors of the body. But how in the world does the astrologer get from these universals to the kind of specific event that he habitually predicts? By what mysterious road, for example, does he

[32]Sig. Q4v.
[33]Howard, sig. T1v; Chamber, p. 60.
[34]Sig. C6v.

travel from the humors of King Henry II to the forecast that this monarch will on such and such a day die of a wound in the head?

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If Astrologie stayed it selfe in this, to foretell the naturall Humours or their effects, which shall be in such Plants and Bodies as are somewhat governed by Planets; it might seeme to have some likelihood. But with this they meddle little or nothing; their curiosity is about mens Fortunes. . . .

. . . and thus forsooth they come warily to the matter. *The starres incline the humour, the humour inclineth the body, the body inclineth the minde; through all these inclinations the starres come at last to worke upon the Soule.* But the force of the Starres is spent in many inclinations, before it come to the Soule, that they dare not say it worketh directly upon the minde, no not upon the body, but onely upon the humour. . . . This being brought either to a Mathematicall demonstration, or to a probable Sillogisme, would prove a feeble consequence, and yet in disputation they are affraid to proceed any further: here they sticke. But if you looke upon their examples, wherein they set the glory of their Art, you shall finde another matter: For in the examples of their Predictions, they foretell the deaths of Princes upon such a day: the fortunes of Kings, the ruines of Kingdomes, the overthrow of Armies. Compare their Principles with their Conclusions, and there is matter to wonder at the absurdity or to laugh at the folly.[35]

One comes away from these clerical critics of astrology admiring their skill in using the rationale of science, even by modern standards. The proportion of this type of argument to the religious type used concurrently in the same books varied, indeed, from writer to writer. Perkins and Calvin were more exercised about the religious and moral dangers of astrology, Fulke and Carleton about its factual falsity. But science was a mainstay for all of them, as it was, of course, for the astrologers themselves. The significant thing, therefore, is the mutual agreement of both parties that astrology had to meet the criteria of a natural science if it were to survive. There had to be a true relationship of natural cause and effect between any given configuration of the heavens and the events predicted therefrom, passing the test of the Aristotelian

[35]Pp. 9-12.

physics and metaphysics then current. So the whole dispute resounded of science and the theory of science. And it is more than slightly ironic that religion wielded more ably the weapons of science than did the scientists themselves.

IV

Astrological Fate

But inasmuch as the main objectives of the attack were religious, it was a foregone conclusion that many of the arguments advanced would be so likewise. These developed under several heads, which can be quickly outlined. Astrology—so ran the first count of the indictment by every one of the clerical writers—was plainly condemned by Scripture. Further, it contravened the rule of Providence by making the stars, not God, the author of events on earth. And even when it recognized God as first cause, it implied that his will was expressed irreversibly in the order of the stars, thereby tying him to second causes and leaving too little room for his spontaneous direction of cosmic affairs. Again, it infringed the principle of men's free will since it explained their doings as determined by a bodily constitution imprinted by the skies. Through both these methods it subtly ate away man's worship of his God and his urge to better himself in morality. Worst of all, in its most blatant forms astrology dared to say that the history of Christian religion and of the individual soul's struggle for salvation was fixed by the rising or setting of some planet or other. Whether astrology was or was not a true science, it was unquestionably guilty of preachings about nature and man which were more than a little impious. Such was the religious attack.

Each of these charges deserves a fair measure of attention. The appeal to Scripture was, of course, inevitable in any dispute about religion. If the mandate of the Bible was clear, the issue was thereby settled out of hand. But the diversity of texts being what it is, not to mention the niceties of translation and interpretation, a writer was dull indeed who could not successfully cloud the argument even when scriptural intent was most palpably against him. In the case of astrology, the assailants were able to muster a rather

convincing array of passages from the Old Testament.[36] These included the injunction in Jeremiah 10:2: "Thus saith the Lorde, Learne not the way of the heathen, and be not afraid for the signes of heaven, though the heathen be afrayd of such." Also, Isaiah 47:13: "Thou art wearied in the multitude of thy counsels: let now the Astrologers, the starre-gazers, and Prognosticators stand up, and save thee from these things, that shal come upon thee." These with others from Deuteronomy 18:9-11 were tirelessly cited against the astrologers, who did their best to evade them by showing, as did Heydon, that the texts had been mistranslated or did not apply to astrology, or in other ways did not mean what they seemed clearly to mean.[37]

In their turn, the astrologers could call on Genesis 1:14: "And God said, Let there be lights in the firmament of the heaven, to separate the day from the night, and let them bee for signes, and for seasons, and for dayes, and yeeres." If the celestial lights were to be signs they must be signs of something, and that something was the kind of thing prognosticated by the astrologer. To this, Perkins then rejoined that they were signs only of the four seasons, the ordinary weather in each season, the ebbing and flowing of the sea, the times for agriculture, and so forth, but not of famines, wars, shipwrecks, the ruin of kingdoms, and the rest of the astrologer's stock in trade.[38]

Resort to Scripture was, in the long run, a matter of some slight embarrassment to judicial astrology but not of anything like fatal consequence. The argument moved on to the question whether astrologers took a correct view of Providence. Perkins complained:

> Concerning the contempt of Gods providence, thus much I say, the *Prognosticatour*, if hee be asked whether he confesse the providence of God, he will with all his hart confesse it: but by his deedes he doth deny it, for all the thinges whatsoever, which can happen in a whole yeare, he attributeth them to the starres, & so he publisheth his Pre-

[36]E.g. Chamber, p. 4 ff.; Carleton, Epistle Dedicatory.

[37]See the citations from Scripture by Thomas Bretnor in his *Almanacke* (1617), the Address to the Reader; Heydon, pp. 23 ff.

[38]Sigs. B6v-8r; Fulke, sig. 37r.

dictions, alwayes mentionyng starres, never, or very slenderly, making any signification of the power & justice, mercy, and everlastyng wisedome of God.[39]

The indignation here is recognizably the same as that voiced by the clergy against scientists in other fields who kept speaking as if the natural forces they described were the only ones in operation, without perpetual reference back to a divine First Cause. Astrologers were willing to acknowledge God when they thought of it, but they did not always happen to think of it. Or they believed that one acknowledgment in the preface to almanac or horoscope should serve for the whole. This did not seem enough to the clergy. Astrology in this respect, therefore, merely incurred, though in a particularly virulent form, the religious animosity directed at all science.

Astrological Fate

To a considerable extent the same is true of the clergy's displeasure with astrology's further insistence that when God worked through the stars, as normally he did, he promulgated an order of nature which he would not lightly choose to break. Astrology, like other natural sciences, needed this principle of normality as a basis for its predictions, both those involving solely the sequence of cosmic affairs and those in which human conduct was implicated. But theologians like Calvin did not relish too tight an order of natural causation. It seemed to bind God in advance to certain decisions. It did not leave the nexus of causation loose enough for the free interposition of divine miracles and the divine twisting of nature to meet the shifts and windings of man's ever-variable transgressions:

If they object that god can use the naturall meanes to chasten men withall: I doe not denye it. But must we saye that this is done by a continuall order even as the starres are thereunto prepared? No but contrarywise when God doth drye up the redde sea and the river Jordan although he did vouchsafe to use the winde proper to do it with all: yet it was not sayde that that winde was stirred by any aspect of the starres: but that God did raise it up at that present.[40]

[39]Sig. B3v; George Gifford, *A Discourse of the Subtill Practises of Devilles* (1587), sig. B4v.

[40]Sigs. C3r & v, C7r, D5r; Fulke, sig. C6r.

Evidently what troubled Calvin here was lest the whole occurrence should by astrology seem to have been too rigidly prefixed. Out of the same fear Perkins said again and again that astrologers could never know more than the general flow and direction of God's Providence. In the details, he said, operated God's "particular working providence, alteryng, and framyng, and bendyng as wax his instruments to his good will."[41] Here was the customary stress of the theologian on the pliability of the order of nature in the hands of the Omnipotent.

The alarm of Calvin and Perkins on this score may appear at first a little hard to understand. According to the doctrine of Providence, the divine foresight was certainly so universal and complete as to devise in advance a system of nature instantly flexible to the slightest debits and credits in man's moral balance sheet. Consequently one would think no new decisions, no special reactions by God should be required. The answer seems to be that when the theologian was thinking, as here, in terms of the practical effects of a doctrine like that of astrology on the fidelity of the people under his care, he did not always take the longer view. We revert again to the problem of prayer treated in Chapter 5. Probably the danger seemed keener here than in other sciences because the courses of the stars were the most strikingly systematized feature of the universal frame and could be infallibly charted for years to come. If people believed that their futures were governed by this inflexible scheme instead of the personal tutelage of God, the days to come would appear likewise inflexible, with all the evil effects to conscience and faith attendant on such a belief.[42] In short, the whole seemed much too mechanistic.

Astrology replied, through the writings of Leonard Digges, Geveren, Maplet, Heydon, and others, that it admitted there might be exceptional breaches in the order of nature but that the theologians multiplied such breaches unnecessarily:

> Because God is not a God of confusion, that he can doo all things at his pleasure, by a certayne inordinate affection, as men doo: but he is a God of order, a keeper of order in his things created, from which

[41]Sig. C5r, also C3v ff.

[42]Chamber, pp. 9-10.

he dooth not rashly digresse, although he tyeth not hym selfe therto, that he wyll not, or cannot alter it, (when his glory by his secret counsaile, and the safeguard of the Church require the same).[43]

Maplet, indeed, identified the opponents of astrology as believers in blind chance.[44] This was the obvious retort to the charges of the anti-astrologians that astrologers championed a doctrine of fate or inevitable destiny. Of course one charge was as unjustified as the other. Astrologers did not believe in unalterable fate any more than the theologians believed in chance or chaos. But the extreme countercharges on both sides showed where the real issue lay. It was, again, one of emphasis, the astrologer needing more certainty for his predictions and the clergyman more uncertainty for the personal Providence of God. Thus it was but a specific focusing of the general division between science and religion on this issue. Here, at least, the astrologer, for all his vain pretensions, was a genuine scientist, defending the primary assumptions of his craft.

Astrological Fate

But the issue of mechanical determinism was felt even more poignantly in predictions of events which would result from human choices—and most predictions were of this kind. Especially offensive to religion was the concept that the heavens, by forming man's passions, gave him a strong impulsion towards virtue or vice. Here the integrity of the soul was at stake. Astrologers might swear as often as they pleased that the stars could incline the will but never compel it and that the wise man, by ruling his emotions, could dominate the stars. But when it came to the crucial queſtion of how many such wise men there actually were, the answer they gave was—very few. Astrology had to give this answer in order to justify its claims to be a science of prediction. The astrologer here, in truth, tottered between Scylla and Charybdis. If he said that most moral choices were not predetermined by the human complexion, he guarded free will at the expense of his own ability to forejudge the outcome on the basis of probability, whereas if

[43]Sheltoo a Geveren, *Of the Ende of This Worlde* (1577), fols. 33v, 21r. See also Digges, fol. 1, citing Melanchthon's defense of astrology against the "*Epicurei theologi*."

[44]Preface to the Reader; also Heydon, To the Reader, fol. 4v.

he maintained the probability of prediction he dangerously narrowed the margin of moral choice. Thus free will decreased as astrological science increased. And since the astrologer was bound to feel a strong gravitational pull to uphold and perhaps expand his science, his temptation was always to reduce the freedom of the will in his actual calculations, however much he might pay lip service to it in theory.

The clergy, being practical men, were most worried about the damage of such an outlook to the faith and behavior of their parishioners. Fulke complained that those who put their confidence in astrology lose trust "in God and his promyses." They get into such a state that they will do nothing without consulting an astrologer to see whether or not the stars permit.[45] In Calvin's experience, "those men which wander amongest the starres, doe descende no more into their owne consciences to examine their life."[46] They lose desire to pray. When the stars promise them good they recline all too easily on that promise without self-discipline or divine recourse. When the forecast is for evil they wait fatalistically for the worst. Their energies dribble away in a vain curiosity about the future, and they come to think that their duty of care stops short at the stars.

Perkins, too, saw moral sloth as the paramount danger:

> Again these *predictions* are verie perillous, for if a manne be wickedly given, they hinder him from the acknowledging of his sinne, because they make him lay part of his faultes uppon the starres, when as all indeed come from his owne soule. And if a man be a penitent sinner and feele the grace of God: yet being weake in faith and conscience, they . . . allure him in som part to attribute that unto the stars whiche is the onely work of God and not of any creature. . . . By these and such like, lewd & dissolute people, take occasions & ar stirred up to live prophanely, & to folow those vices unto which, ye lusts of their nature carry them.[47]

By way of answer, astrologers like Heydon tried to draw an analogy between astrology on the one hand and physiology and

[45]Sig. D3v.
[46]Sigs. C6v ff.; James Mason, *The Anatomie of Sorcerie* (1612), p. 9.
[47]Sigs. F5v-6r. Also Calvin, sig. D6r; Ferrier, fol. 25v.

psychology on the other. Were the teachings of astrology about free will any worse than those of the other sciences which taught that an individual's bodily constitution gave, by a predominance of one of the four humors, a cast or bias to his entire temperament and hence to his disposition to be vicious or virtuous? Did not astrology, in fact, merely go one step farther back to show how these physiological and psychological processes came to be what they were? To condemn astrology because it built a stairway of cause and effect leading down from the stars to the ethical decision was to denounce every science that relied on a system of nature for the better understanding of man and his affairs. All made their guesses. And astrology never contended that its guesses were infallible, merely that they were contingent and probable.

Astrological Fate

This association of astrology with deterministic psychology did not endear either one of them to the clergy. Religion was against physical determinism wherever it could be found. In predestination and the doctrine of original sin Calvinism had, of course, a determinism of its own, but that was of a spiritual, not a physical sort. Spiritual determinism of the human will was an adjunct of God's power and therefore legitimate, whereas a material determinism of it through the body seemed to subordinate the soul to the world of nature and make it too completely a creature of the flesh. Religion could never go so far towards materialism.

V

For essentially the same reason the Elizabethan clergy were bitterly aggrieved by the tentative efforts of some astrologers to take jurisdiction over the past history and future prospects of religion itself. Some had dared to cast the horoscope of Christianity, Judaism, Mohammedanism, and other faiths and had ascribed the rise, continuance, and fall of each to the constellation under which it began. Albumazar and Cardan had traced the life of Christ, not excluding his miracles, back to the figure of the heavens at his nativity.[48] Guido Bonatus "found a constellation to figure and

[48]Howard, sigs. Ff4v-Gg1r; Reginald Scot, *The Discoverie of Witchcraft* (1584), pp. 213-14.

prognosticate the floud." Applying these principles to individuals, Ptolemy or some of his imitators had declared that birth under Jupiter and Saturn made a man a Jew, under Jupiter and Mars a worshiper of Persian gods, and so on.[49] According to Maternus, those born under Saturn in Leo are sure to go to heaven. Albumazar was guilty of the impiety of assuring the world that "he that shall pray to God for any thing, when the Moone and Jupiter are joyned in the head of the Dragon, shal obtaine whatsoever he asketh."[50]

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Certainly these were types of explanation which Christianity could not endure for a moment. Many of them, in the first place, came from pagans or atheists who had no love for the Christian faith. And even should they be offered with ostensible piety under the assurance that nature was but the handmaid of God and the stars the instruments of his will, still only blasphemy could suppose that God would entrust to second causes the most urgent affairs of his universe, those for which the whole had in fact been created —the fate of his Church and the salvation of each of its members. Such crucial matters were under the direct guidance of the Holy Ghost. Any other opinion was materialism of the worst kind. Religion could not be subdued to nature, but stood forever above it. The free flow of grace from God to man could not be pictured as winding mechanically through channels of natural causation.

Now if the writings of the Elizabethan astrologers are searched dispassionately, the finding must be that none of them was at all anxious to claim pre-eminence over religion. They were quite content to remain as its humble servants, if that were permitted them. Heydon spoke for all when he emphatically excluded from the purview of astrology everything connected with ecclesiastical history and human salvation.[51] Those matters were beyond the sway of nature and therefore equally beyond the sway of astrology

[49]Howard, sig. Dd4v.

[50]Willet, p. 12; Chamber, pp. 10-14.

[51]P. 94. According to E. Renan, *Averroes et L'Averroisme* (Paris, n.d.), p. 326, the impious doctrine of the horoscope of religions appears for the first time in the writings of Pierre d'Abano, the founder of Paduan Averroism. It was taken up later by Pomponazzi, Pico della Mirandola, Cardan, Vanini.

which, like other physical sciences, dealt solely with the natural world. I have found only one or two foreign importations into England taking a different view. In the main, consequently, the issue was fictitious. But it had obvious propaganda value for the clergy as an exhibit in the chamber of atheistic horrors and served as a warning of the peripheral dangers still looking in upon religion from the potentially impious restlessness of astrology.

Astrological Fate

For today, it has, perhaps, somewhat more than antiquarian interest. The claim of some astrologers to interpret religious events in the light of the stars was just such a logical extension of astrology as that occurring now, for instance, in the field of psychology, which similarly interprets religious attitudes by its own concepts and categories. Other sciences and other disciplines, among which the economic interpretation of history is conspicuous, seem to have this same drive to gravitate outwards and to absorb all the available phenomena. The guess may be risked that if astrology had survived until today as a natural science its practitioners, most of them, would now be following the example of Albumazar, Cardan, and Bonatus.

The question why astrology has not survived except in our intellectual slums is one of some moment. It had, even by the end of the sixteenth century, great champions among the English scientists, who were possibly attracted by those very leanings towards mechanical determinism which drew down the wrath of the divines. Accustomed to assuming the normalcy of nature and the continuity of man as a physical organism, they were readier to discover the operation of natural law where others did not. As long as God's liberty to intervene in nature and man's liberty to make his own choices were preserved in all theoretical utterances, these men were disposed to go far in paring both very thin in practice. To be sure, the premises of astrology as a science were under attack from all directions. But it had ancient authority, still highly potent with Renaissance natural philosophers and, better yet, it had the general consensus of contemporary thought that the stars contributed to the formation not only of the earth's climate but especially of the individual human temperament. This granted, the rest

was not so improbable as today it seems to us, who grant nothing.

The whole baseless fabric of this vision, which was to vanish during the next century, was already vanishing as the Elizabethan age ended, together with demonic possession, witchcraft, alchemy, and kindred phases of human error. Astrology had suffered in that age no fewer than six panoramic attacks, while eliciting only one full defense. This ratio was a straw in the wind. And although the source of these attacks was in almost every case religious, the specifically religious arguments were not the effective agents of demolition. Astrology did not pass out of men's minds because it violated Scripture or the principles of Providence and free will. It lapsed because it could not prove its right to be a science under the increasingly rationalistic and empirical requirements of the seventeenth century. With its mortal defect in theory went its failure to show any convincing empirical success in its forecasts. Anything else might be overlooked, but not this. In pointing out both these defects, religion for reasons of its own was a protagonist. And scientists for once unwittingly played the obscurantists. It was a singular spectacle, not without its ironies. Here the role of religion was both a symptom and a cause—a symptom that the intellectual life of the times was thoroughly permeated with the concepts of science and in turn a cause of their wider and deeper dissemination.

Science and Religion in Elizabethan England

That the problem of astrology was but a segment of the larger problem of Providence has been the burden of the present chapter. On the side of the clergy the debate owed its bitterness to the close involvement of astrological predictions with the whole Renaissance doctrine of man, much of it sacred to religion. Our discussion, therefore, has served as a prelude to the detailed exploration of that doctrine, notably in the fields of medicine and psychology, now to follow. All the already familiar questions will reappear with new faces. And still others will arise for the first time from the concept that man is the only creature in whom a mortal body is joined mysteriously with an immortal soul.

II

Man the Composite

THE RENAISSANCE doctrine of man offered infinite complexities for science and religion, but at the root of them all lay the one giant metaphysical fact that man, alone among the beings of the universe, was compounded of both matter and spirit. Below him in the hierarchy of creation were the mineral, vegetable, and animal kingdoms which were pure matter. Plants and animals indeed had souls, but they were "drowned in the blood," perishable, composed of the elements and not of spirit. Above man were God and the angels, who were pure spirits, acting, to be sure, upon matter but not essentially combining with it. Only in man did that spirit called the soul somehow wonderfully fuse with body to form one life.

Man was therefore unique, and yet deeply participant in the two orders of existence. In so far as he was a body he was subject to the natural laws of motion and change, generation and corruption, growth, procreation, and death. As soul he escaped those laws and received the higher injunction to know, to love, and to obey God and cherish his fellow man. As the meeting place of both body and soul he was that "proud yet wretched thing," a man, lord of the lesser creation, the being for whom God made the world and Christ suffered crucifixion, but also the sole battleground of spirit with flesh, and therefore the bearer of a burden known to no other creature. On him rested the duty of goodness, the possibility of salvation, and the necessity of immortality.

Among the manifold fields of study through which Renaissance man strove to know himself, three pertain especially to our topic: theology, of course, and the two related sciences of psychology and medicine. The latter will here be taken for purposes of con-

venience in a very broad sense as including human biology, anatomy, physiology, and pharmacology, because it was in Elizabethan medical works that these allied sciences were chiefly used and expounded. Psychology, which was for the Elizabethans a part of natural philosophy, that is, a science, will likewise be treated as such here without nice cavil as to terms. We shall do well at this point, however, to reach some preliminary notion of the several spheres and interrelations commonly assigned to theology, psychology, and medicine, and of the main areas of tension between them. On this first survey may then be grounded the organization of chapters to follow.

Science and Religion in Elizabethan England

The subject of religion being the soul's relationship with God, the clergyman was interested in body only as a necessary vehicle of soul and as a source of its perennial temptation.[1] Hence his concern with the medical sciences was simply that they should never forget that the human organism with which they dealt was made for the soul and was ultimately governed by the Providence of God; in other words, they must never, through their preoccupation with matter, become oblivious to its dominance by spirit. This broad principle had several applications. In the first place, physicians must recognize soul as a spiritual substance, radically different from and superior to body, not merely a phase or consequence of it. That is, they must avoid materialism. Again, physicians must not conclude that the condition of body dictated irrevocably what the soul willed and knew. That is, there must be no doctrine of physical determinism. Furthermore, they must always remember that the human body, like everything else in this world, was ruled by the providential plan of God, who allotted physical sickness or health in order to benefit the soul either by testing its patience or by punishing its sin. The manner in which these several religious requirements were accepted and qualified by the medical sciences will be one of the more far-reaching aspects of our study.

[1]Aquinas, *Summa Theologica*, Pt. I, Q. 75: "Now the theologian considers the nature of man in relation to the soul, but not in relation to the body, except in so far as the body has relation to the soul. Hence the first object of our consideration will be the soul."

Psychology, dealing with the activities of soul in body, stood as it were half way between medicine and religion, looking towards both, and resisting the excessive claims of both. From the medical sciences it borrowed basic knowledge of anatomy and physiology, and built upon them a theory of how the body's temperament in health and disease (especially mental disease) may affect the functioning of soul. In return, psychology contributed to medicine a theory of how emotional perturbations conduce to bodily disease. Indeed, on this common ground of the interaction of soul with body the two sciences were so nearly one that only their difference in emphasis justifies a distinction between them, psychology caring more for what the body does to the soul and medicine reversing the interest. But psychologists had to be alert to the dangers of medical materialism and determinism which would have reduced their science to a branch of biology. And physicians were no less anxious to keep medicine from becoming primarily psychiatric.

Man the Composite

Equally complex were the connections of psychology with religion. From religion it received its basic doctrine of the divine nature, origins, and destiny of the soul. Indirectly also from religion, through the principles of ethics, its idea that the aim of psychology was to lead men, by an understanding of their mental and emotional processes, to an effort to control them for rectitude here and eventual salvation hereafter. Reciprocating, psychology gave to the clergy an analysis of the soul's faculties by which they might describe what happened inside a man under contrasting conditions of sin and grace, and which also they might apply to the practical daily problems of exhortation and consolation among their flocks. But the inevitable conflicts of interest arose. Divines tended to look at every act in the internal drama of man under the aspect of virtue and sin, salvation and reprobation. More important still, many divines, particularly those of Calvinist and Lutheran bent, inclined to allow man little or no control over these acts but to attribute them instead to the free grace of God, mysteriously given or withheld, no one knew how. Psychologists, on the other hand, preferred to view the human mind in a dryer

secular light as something of a closed circuit operating in itself. They admitted, of course, a constant intervention by supernatural grace, but then often went on to discuss the system of the mind as if it were purely natural. Here was a parallel to the drift of physicians towards insulating the medical sciences from supernaturalism.

Science and Religion in Elizabethan England

These, then, are the topics awaiting detailed analysis: God and the human body, body and soul, God and the soul, involving respectively the connection of religion with the medical sciences, of psychology with medicine, and of psychology with religion. But as a general preliminary we had best look more closely at the Elizabethan definition of soul, for in this lie the seeds of all that follows. Nor can we altogether neglect the metaphysics of its union with the body.

A principal effort of theologians in defining the soul was to distinguish it from the physical organism. Said William Perkins in *An Exposition of the Creed* (1595):

> As for the soule, it is no accidentarie qualitie, but a spiritual and invisible essence or nature, subsisting by it selfe. Which plainely appears in that the soules of men have beeing and continuance as well forth of the bodies of men as in the same; and are as well subject to torments as the bodie is. And whereas we can and doe put in practise sundry actions of life, sense, motion, understanding, we doe it onely by the power and vertue of the soule.
>
> Hence ariseth the difference betweene the soules of men, & beasts. The soules of men are substances: but the soules of other creatures seeme not to be substances, because they have no beeing out of the bodies in which they are: but rather they are certaine peculiar qualities arising out of the matter of the bodie, and vanishing with it.[2]

Calvin likewise called soul "a bodiles substance" and drew his evidence from Holy Writ, for "it were but folly to borrow of the Philosophers a definition of the soule, of whom almost none, except Plato, hath perfectly affirmed it to be an immortal substance."[3] After ranging widely over the diverse definitions suggested by philosophy, Melanchthon in his *De Anima* also came

[2] In *Works* (1605), p. 170.

[3] *Institutes*, fol. 54r.

to rest finally on Scripture for his view that the rational soul is an intelligent spirit, not extinguished when it leaves the body but living forever.[4] Noteworthy is the insistence by all these writers that the soul cannot be immortal unless it is a substance separate from the body, which so obviously decays and is lost; but by revelation we know that it is immortal; therefore it must be a separate substance, belonging to the order of spirit. Henry Bullinger's sermon "Of the Reasonable Soul of Man" bolstered this reasoning with the Genesis idea that God creates each soul out of nothing:

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> The soul is a spiritual substance, poured of God into man's body, that, being joined thereunto, it might quicken and direct the same; but being dissevered from the body, it should not die but live immortal forever.[5]

Thus for Elizabethan Christianity the soul is incorporeal, intangible, invisible, yet supremely real. It comes direct from God and returns to him. Not being transmitted from parents it inherits none of their characteristics except as it may be affected by body, in which the laws of heredity do obtain. It can never be touched in its essence by physical disease, though its functioning deteriorates as its organs in the body deteriorate. But to spiritual disease it is subject. For, though created pure, it inherits from Adam, at the instant when it is infused by God into the child in the womb, the stain of original sin—not indeed by any physical transmission but by a kind of racial guilt. Thereafter, through its failure to resist concupiscence, it acquires sins of its own.

In defense of this Christian analysis Elizabethans were accustomed to recite and refute many of the rival theories about the nature of the soul which had been voiced by Greeks and Romans, Jews and Arabs, Aristotelians and Neo-Platonists and Averroists down through the centuries. Such theories could be classified, as Melanchthon pointed out,[6] according to whether they defined

[4] (Vitebergae, 1542), fols. 2v ff. and 11r.

[5] *Decades* ed. Thomas Harding (1849-52), Parker Society, IX, Decade 4, Sermon 10.

[6] Fols. 2v-3r.

soul as a body, or as a temperament of body, or as an incorporeal substance. Robert Burton in *The Anatomy of Melancholy* (1621) prefaced his own discussion of the soul with a summary of other men's errors:

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> Many erroneous opinions are about the essence & original of it; whether it be fire, as Zeno held; harmony, as Aristoxenus; number, as Xenocrates; whether it be organical, or inorganical; seated in the brain, heart or blood; mortal or immortal; how it comes into the body.... Galen supposeth the soul *crasin esse*, to be the temperature itself....[7]

Sir John Davies in *Nosce Teipsum* (1599)[8] and Davies of Hereford in *Microcosmos* (1603)[9] traversed in greater detail much the same ground. So did La Primaudaye [10] and many others.

One of the best of all analyses, however, was that translated in 1636 by George Withers from Nemesius, an early Church Father, under the title *The Nature of Man*. Nemesius listed the Stoics and the atomists, Democritus and Epicurus, as chief supporters of the belief that soul is matter:

> The Stoicks affirm, that it is a certain Blast, hot and fiery. Critias holds, that it is bloud. Hippon the Philosopher, will have it to be water. Democritus thinks it is fire; and his opinion is, that the round formes of indivisible bodies or Atomes being incorporated, by ayre and fire, do make up the Soul.[11]

Then there were many, added Nemesius, who thought soul not a body, but a motion, or a number, or a harmony:

> Thales, who was the first of that opinion, held that the Soul was always in motion, and had that number from it selfe. Pythagoras thought it was a number moving it selfe. Plato affirmed that it was a substance (to be conceived in mind) that received motion from it self, according to Number and Harmony. Aristotle taught that it was the first continuall motion of a Bodie-Naturall, having in it those Instrumentall parts, wherein was the possibility of life. Dinarchus took it to be an Harmony of the foure Elements: not a Harmony

[7]Ed. A. R. Shilleto (1896), I, 185.

[8]Pp. 59 ff.

[9]Pp. 83-87, 218-19.

[10]*The Second Part of the French Academie* (1605), chap. 82, p. 498; Sir Walter Raleigh, *A Treatise of the Soul* in *Works*, ed. Oldys and Birch (1829), VIII, 575.

[11]P. 78.

made of sounds, but as it were a tunable temperature and agreement, of hot and cold, moist & dry things, in the Bodie. But, it is without doubt that all the best of these doe agree in this, that the Soul is a substance. . . .[12]

We can see that each of these rival theories drew its explanation of the inexplicable from some science or art, but chiefly from science. The idea of harmony came from music, with perhaps some overtones of mathematics.[13] The number idea was from mathematics; that of motion was from physics, as was also that of elements or atoms; that of bodily temperature from the medical sciences. It seems clear that in England before 1610 only the latter posed a possible serious threat to the Christian belief in soul as spirit because medicine, broadly defined, was the only one of these subjects which had both a materialistic bias and an active standing as a practical, developing science closely associated with the study of man. Mathematics was highly thought of, but the metaphysical status of numbers was in doubt, and its practitioners were working on topics like logarithms, calculus, astronomy, or on the utilitarian side, navigation, surveying, and gunnery—all apparently remote from the nature of the soul. Physics, before Galileo and his followers changed all that, was as yet a neglected part of natural philosophy hardly emerged from metaphysics. Atomism had few disciples in Elizabethan England. But the medical sciences worked every day on the very threshold of the soul and seemed perpetually tempted to cross it.

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How profound and lasting were the differences between the religious and the scientific attitudes towards the soul may be seen in the contrast between Plato and Aristotle, their ancient representatives. Plato, from whom, together with Holy Writ, Augustine drew that conception which became the traditional Christian one, thought of the human soul as a substance distinct from its body, united to it in life but completely separable in death. In all ages this, or something generically like it, has been essentially

[12]P. 79.

[13]Plato in the *Phaedo* (Loeb), pp. 299, 317, attacked this view, and Aristotle in *De Anima*, Bk. I, then did as much for Plato's own views as well as those of the pre-Socratic physicists.

the judgment of religious and ethical thinkers. Man's deepest devotional and moral instincts seem to require a soul not too closely identified with the ailing, changeful, and sensual body. But on the other hand his need to understand what the life processes are, how the whole individual feels, thinks, acts, requires a conception of soul as very intimately related to body. Otherwise it becomes increasingly hard to see how functions of body produce functions of soul and vice versa. These may be called the needs of science. In fact, the temptation on this side is to regard man as an indivisible unity not composed of two distinguishable substances at all.

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Aristotle in *De Anima* tried to solve the problem from this point of view by describing soul as form and body as matter, the whole composing the living organism. He thought it unnecessary to decide whether the higher reason could survive after death. That question simply did not concern him as a psychologist who studied the operations of the soul here and now, in this world and in this body. Likewise in his physiological works Aristotle was interested in the life function as observed by science, broadly conceived. In the *Nichomachean Ethics* also, since he did not look at passions as normally bad, he was able to play down the separateness of soul and body. The same needs of science caused Galen to knit body and soul as closely as possible by the doctrine, expressed in *De Temperamentis* and elsewhere, that the manners of soul follow the complexion of body. Nor did he care to commit himself at all clearly on the question of immortality. His materialistic leanings continued to pervade medicine while it remained Galenic. And in the seventeenth century Sir Thomas Browne could still note in *Religio Medici*, "I remember a Doctor in Physick, of Italy, who could not perfectly believe the immortality of the Soul, because Galen seemed to make a doubt thereof."[14]

The post-classical history of the treatment of soul under Christianity may be summed up as an effort to keep both the Aristotelio-Galenic unity of soul-body for purposes of science and the Platonic-Scriptural diversity of the two for purposes of morality and salvation. The latter had to be uppermost in orthodox Chris-

[14]P. 36.

tianity, which taught both the vileness of sensual passions flowing from original sin and the soul's immortality as an individual. Averroism, challenging the latter idea from the thirteenth to the sixteenth centuries, made the individual soul merely a perishable aspect of body. Averroistic doctrine therefore fitted well with the permanent tendencies of the medical sciences and became prevalent in the medical school at Padua from the fourteenth century on. Since the wane of Averroism, the biological approach to man has, of course, found other reasons to nullify or enfeeble the separate spirituality of the soul.

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Having chosen to define soul as a spiritual substance radically other than body, Christian philosophy faced in consequence the difficulty of explaining how two such disparate substances could be joined together at all and could function upon each other as a unity. Theologians in general were forced to agree with Sir Walter Raleigh's understatement that "the substance of the soul is hardly known."[15] Its immortality was indeed known from Scripture, and information about its faculties could be inferred from the manner of their operation within the flesh. But in its essence soul was something *sui generis*, unsearchable by man and open to God alone. Being incorporeal, however, it could not be supposed to have length, breadth, or thickness.[16] How then might it be said to occupy a body which does have these dimensions? Can unextended spirit occupy place? Nemesius' answer was that technically it cannot, that when soul

> is said to bee in the body, it is not said to be there, as in place; but, to be as it were in a certaine relation to the body; and to bee present with it in such a sense as, God is said to be in us.[17]

[15]P. 574. See Augustine, *The Magnitude of the Soul*, tr. J. J. McMahon in *Writings of St. Augustine*, ed. L. Schopp (1947), II, 60: "I believe that God, its Creator, is, so to speak, the soul's proper habitation and its home. As for its substance, I really cannot find a name."

[16]Augustine, p. 63: It is "not long, or wide, or strong, or any of those things that one usually looks for in measuring bodies."

[17]P. 200. The favorite metaphor used by Nemesius and by many Renaissance writers to describe the presence of the soul in the body is to compare it with sunlight suffusing air—union without confusion. Cf. Sir John Davies, *Nosce Teipsum* (1599), p. 99.

Calvin and others located the soul more concretely in the body, saying that "although properly it is not comprehended in place, yet it is set in the body, & doth there dwel as in a house. . . ."[18] This was an evident abdication of the whole metaphysical problem and represented the common sense view adopted by most. The confusion, however, permeated Renaissance treatments of the soul and led to many ambiguous descriptions, notably by Sir John Davies[19] and other poets, which sometimes seemed to imply that soul was a prisoner of body and sometimes that, waking or asleep, it actually substantially flew over earth and sky in its mission of thought and imagination.

Another phase of the problem was whether the soul had parts which could be located in this or that organ of the body. This was a concern of both medicine and psychology. Plato, though affirming in the *Timaeus* that each man had but one soul, divided it into three parts, the vegetal, sensitive, and rational, residing respectively in the liver, heart, and brain. But Aristotle considered the whole soul as the form of the whole body and therefore indivisible in place though distinguishable into various faculties. Following him, Augustine in his *Magnitude of the Soul* established the famous formula, which became standard for the Elizabethans, that the whole soul is everywhere in the whole body and in every part of it. This dictum was a logical consequence of Christian metaphysics. Clearly a spirit having no extension could not be physically split up and parceled out among the various bodily organs. Yet, equally clearly, different organs exercised different functions both physical and psychological which seemed to call for some kind of differentiation within the indivisible spirit. The remedy was to declare, as Aquinas did,[20] that the spirit, while remaining always indivisible and wholly present in every part of the body, expressed its several faculties of cogitation, emotion, nutrition, and so forth, through such particular localized organs as brain, heart, liver.

[18]Fol. 54v.

[19]P. 78.

[20]Pt. I, Q. 86, Art. 8.

For the very highest faculties of abstract reasoning, conscience and will, however, the soul had no physical organs whatever but performed them of itself.

Then there was the still narrower form of the same question, whether within the human brain the soul's powers of sense perception, imagination, cogitation, and memory should be localized in separate partitions or regarded as functioning impartially throughout the brain mass. Discussing reason, imagination, and memory, Andreas Laurentius remarked in *A Discourse of the Preservation of the Sight* (1599):

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> I know very well that there is a great quarell betwixt the Greeke and Arabian Phisitions, about the lodgings of these three princesses, & that no man hitherto hath bin able to reconcile them. The Greekes would lodge them in everie part of the braine; the Arabians quarter out every of them by it selfe.

His own conclusion was

> ... that the Greekes had plaide the more subtile Philosophers, and that their opinion is the more true: but that of the Arabians will ever be more followed of the common people, for that it hath in it a greater shew of evident cleerenes.[21]

Even a cursory reading of Elizabethan treatises on medicine and psychology would prove that the Arabians had indeed prevailed. The situation of common sense and phantasy in the brain's frontal chambers, of cogitation in its middle, and of memory in its rear was a commonplace of contemporary science.

Such then was the metaphysical problem as regards the localization of the soul. To sum up: the soul's essence was not localized, but its faculties functioned locally. Still to be met was the no less troublesome problem of how this incorporeal spirit, the soul, could act through, and be acted upon by, organs which were, after all, only physical matter. By what unimaginable means could the incorporeal reach the corporeal? Christian thinkers since the early Fathers had tried desperately but vainly to see into the

[21] Pp. 78, 80.

mystery, and the Elizabethans merely shared their bafflement. The difficulties were thorny in the extreme. In the process of sense perception, for example, the 'form' of the perceived object (Aristotelian 'form' being in itself an intangible something not easy to conceive) was said to strike upon the external organ of sense and to be transmitted up the nerves on the stream of 'animal spirits' to the physical organ of phantasy in the brain's frontal lobe. Thence it passed into consciousness, that is, into the soul itself. How? No one could say. Perhaps by a further channel of 'spirits.' But these spirits were themselves nothing more than matter—matter refined to its subtlest, yes, but in the last analysis still only matter. Then in order to produce feeling or action resulting from the sense perception, the immaterial soul had to transmit a message back to the body, this time to the heart, to the muscles of the limbs, and so forth. Again the medium was these same animal spirits, these rivers of subtilized matter coursing through the arteries. And again nobody knew quite how. The student of the body could describe movements and communications, and through them give some illusion of explanation. But at the crucial point, the going over from the organ to the soul's faculty and back again, he was silenced.

These animal spirits seemed to many the key of a solution. They were the most immediate instrument of the soul, as Melanchthon called them, or as Peter Lowe said in *Chirurgerie* (1597) "a substance subtill and aerious of our bodie, bredde of the part most pure and thinne of the bloud. . . ."[22] Others likened them to a pure, ethereal flame. If only they could be conceived of as sufficiently rarefied, their manner of connecting soul with body might some-

[22]Sig. D2 v. These spirits were described in every general work of medicine or psychology. Valentinus, *Enchiridion Medicum* (1612), p. 10: "A Spirit is a subtile flame, or rather an airy substance. . . . Spirits be two-fold, the one vitall, the other animall; the vitall Spirit is a subtill flame engendred from the bloud, and is dispersed by vertue of the heart into all the body, to give unto the same lively heat, and a power of motion and action . . . the forme is the flame it selfe, flying through all the Artiers. . . . The animall spirit is as it were a starr-beame, which is sent from the braine by the Nerves into all the body, to give motion, and sense. . . ." Cf. John Jones, *A Diall for all Agues* (1566), sig. C6r; La Primaudaye, p. 433, etc.

how become more intelligible. Timothy Bright in his *Treatise of Melancholie* (1586) went farther in this direction than most other Elizabethans. For him the spirits were "ordained of God, as it were a true love knot, to couple heaven & earth together." He regarded spirits as neither matter nor true spirit but as something between, something to which the Holy Spirit that created the world had imparted a portion of his virtue:

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> Nowe although these spirites rise from earthly creatures; yet are they more excellent, then earth, or the earthie parts of those natures, from which they are drawne; and rise from that divine influence of life, and are not of them selves earthie; neither yet comparable in purenesse & excellencie, unto that breath of life, wherewith the Lord made Adam a living soule.... So then these three we have in our nature to consider distinct, for the clearer understanding of that I am to entreate of: the bodie of earth: the spirit from vertue of that spirit, which did as it were hatch that great egge of Chaos: & the soule inspired from God, a nature eternall and divine....[23]

But by thus bringing a third, semi-spiritual substance between true spirit and body Bright merely cut off the head of Hydra, leaving two problems where only one was before. We are still bound to ask how impulses reach from body to this intermediary, and then from this intermediary to the soul.

If these Elizabethan accounts of the interaction of soul with body seem physiologically naive today, anyone who knows the true answer to the riddle may cast the first stone. The Elizabethan Christian explained the process as well as he could by the science of his day, and what he could not explain he referred to faith. Because of his faith he had in the first instance made strict the distinction between body and soul in order that the soul might belong indubitably to God. Having won so much he was willing to incur the metaphysical and scientific predicament of showing how two such totally different entities could fuse and cooperate in a single life. Materialism solves this predicament by denying that it exists, since there is no soul. But in so doing it rubs out one mystery only to write another. For it is then forced to derive

[23] P. 37.

from matter, whether from Elizabethan humors or from modern infra-atomic particles, not merely the bare phenomenon of consciousness but even the higher reaches of creative thought and longing. To Christians this may well seem the harder mystery. With the contest of the Elizabethan Christians against medical materialism and with their effort to conceive rightly the interfunctioning of matter and spirit in the fields of medicine, psychology, and religion the ensuing chapters are concerned.

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12

The Physician as Atheist

SUCH was the reputation of medical men for irreligion in the Middle Ages that, according to a medieval Latin proverb, two out of three doctors were atheists: *Ubi tres medici, duo athei.*[1] Chaucer glanced at the same notoriety in his Doctour of Physicke, whose "studie was but litel on the Bible." Nor had this reputation grown better during the Renaissance. In the opening sentence of his *Religio Medici* written in 1635, Sir Thomas Browne, himself a physician, felt called upon to protest that he actually had a religion despite "several Circumstances that might perswade the World I have none at all, as the general scandal of my Profession, the natural course of my studies. . . ." No doubt this charge of infidelity against the medical man had long since settled into a tradition difficult to dislodge under the best of circumstances. But there were also continuing forces at work to preserve and intensify it which we may be interested in examining.

Significantly, admission that the popular accusation was sometimes true came even from within the medical profession. As a preface to his translation of Franciscus Arcaeus' *A Compendious Method of Curing Woundes* (1588), surgeon John Read wrote a poem entitled "A complaint of the abuse of the noble Arte of Chirurgerie" lamenting the ignorance and immorality of many practitioners, and adding:

> And some moreover papists are,
> some nulli fidians likewise be,
> Some atheists temporisers, and
> some machivells a griefe to see,

[1]See H. T. Riley, *Dictionary of Classical Quotations* (1902), p. 472, and *The Oxford Dictionary of English Proverbs* (1935), ed. W. G. Smith and J. E. Heseltine, p. 582.

And some so stained are with vice,
that they more likely doe appeare,
Incarnet divells for to bee,
then such as live in Godlie feare. . . .[2]

We notice, however, that this atheism is not given a particularly prominent place in the six-page catalogue of delinquencies.

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Much more is made of the matter in William Bullein's *A Dialogue against the Fever Pestilence* (1564), which indeed is one of the most detailed and searching arraignments of medical irreligion available in Elizabethan times. Bullein was both a theologian and a medical man. He had held a rectory in Suffolk in the early 1550's, had later traveled on the Continent to study medicine, and had published four medical works which enjoyed considerable popularity.[3] His dual training lends a special value to his comments.

These are presented in the *Dialogue* as a conversation between Medicus and his patient, a merchant named Antonius, sick of the plague. Medicus begins by citing the scriptural text in Ecclesiasticus 38 which requires that the physician receive honor for his healing, but he neglects to mention that portion of the text which reads "of the most higheste cometh learning." When this failure of religious humility[4] is pointed out to him by Antonius, Medicus retorts, ". . . I care not, for I medle with no Scripture matters, but to serve my tourne."[5] The Merchant agrees that he, too, pays no attention to the Bible, whereupon Medicus confides,

[2]Fol. 3r. Likewise E. D., *The Copy of a Letter Written by E. D. Doctour of Physicke* (1606), p. 16, contrasts the mendacious quack doctor with the reputable physician who does not tell lies: "On the contrary, the learned Physitian (though he have no religion) will not, for his credit sake, be found to utter any untrueth."

[3]Besides the *Dialogue*, which went through three editions (1564, 1573, 1578), Bullein wrote *Bulleins Bulwarke of Defence againste all Sicknes* (eds. 1562, 1579), *A Comfortable Regiment against Pleurisi* (1562), and *The Governement of Healthe* (1558, 1559, 1595). His views on medical irreligion therefore attained a wide circulation. His own books were pervaded with warm religious feeling.

[4]The proper Elizabethan doctrine is that voiced by John Hall adjuring his fellow surgeons (see his translation of Lanfranc's *A Most Excellent and Learned Woorke of Chirurgerie*, 1565, sig. Fff2r): "Finally, see that ye ascribe al honor unto the Holy Trinitie, and seke not in any wyse your owne prayse and vayne glorie, least ye therein displease GOD, and justely provoke hym to withdrawe his grace from you, whose instruments ye are, whyle ye dooe well, as is the hammer in the hande of the woorke manne."

[5]Sigs. B2v and B3r of 1564 ed. Subsequent citations likewise to this edition.

Med. Herke in your eare, sir, I am neither catholike, Papiste, Protestante, nor Annabaptiste, I assure you.

Ant. What then: you have rehearsed choyce and plentie of religions. What dow you honour? the Sonne, the Moone, or the starres, Beast, Stone, or Foule, Fishe, or Tree?

Med. No forsothe. I doe none of them all. To be plain, I am a Nulla fidian, and there are many of our secte. *The Physician as Atheist*

Ant. Oh. Qui dixit in corde suo non est deus.[6]

The talk then drifting to the question whether man has a soul, Antonius expresses the opinion that the existence of a soul proves that there is a God who created it. Medicus in reply again declares, "... I credite not the Bible matters, I am no Divine, I finde no reasons for my tourne," and launches instead into a disquisition on the vegetative, sensitive, and rational functions of the soul based on Aristotle's *Ethics*. With a triumphant air he concludes by asking, "How like you this maner of talke, yet here is no scripture, but Aristotle, I assure you."[7] His final advice to his patient is to preserve his life at all costs since life "is the best jewell, whiche brings delites to the hart, pleasures to the iye and eare...."[8] This is condemned marginally as "An Epicures talke." Then Death (Mors) enters to censure and correct all those improper doctrines. The end of human life, he says, is appointed by God: "Neither is the saiyng of the Philosophers, or Poetes true, whiche compt that I come by chaunce, to mortall things, or inquiring the cause of the matter, or Deprivatione in materia, or of generacion and corrupcion."[9] And as for the soul and its Aristotelian functions, the ability to dispute about them, to distinguish between knowledge and judgment, reason and desire—"All these make not to the heavenly purpose but rather standing upon soche trifles doth hinder the waie to salvacion in Christ...."[10]

Such are the general outlines of this satirical portrait of a worldly and unprincipled doctor. The central accusation is that

[6]Sigs. B4r & v.

[7]Sigs. D4r & v ff.

[8]Sig. F4r.

[9]Sigs. L2r & v.

[10]Sig. L8r.

he has chosen Aristotle before God and set up natural science instead of theology. Consequently, the soul has become for him only a kind of superior organ of the body, subject to the usual physical laws of growth and dissolution, without supernatural origin and without prospect of immortality. Medicus still quotes Scripture when it is to his advantage to do so, but at heart he believes in nothing but earthly pleasures. And, so believing, he has lost all sense of professional ethics and has simply set out to bilk his patient of the greatest possible fee, although knowing from the start that the disease is fatal. Here, implied Bullein, is the conduct which logically results from religious unbelief. Not that Bullein scorned medical knowledge when it is kept in what seemed to him its right place. He was pointing out what happens to "many of our secte" who sever such knowledge from its proper dependence on God, dwell so much upon natural laws as to become thoroughgoing materialists, and forget that the natural must always be subject to the supernatural. Irreligion represents, as it were, an occupational disease to which the medical man is exposed by his constant dealing with a positivistic, pagan body of knowledge.

It is instructive to notice that Bullein's general basis of criticism is quite the same as that which had been current in the Middle Ages. John of Salisbury put his finger on it in *Polycraticus*: "Physicians however, placing undue emphasis upon nature, in general encroach upon the rights of the author of nature by their opposition to faith. I am not accusing all of them of error although I have heard very many of them arguing about the soul, virtue and its works, growth and decay of body, the resurrection of the same, and creation in a manner contrary to the tenets of faith."[11] Here we find the materialistic attitudes of doctors gravitating to the same topics of the soul and its workings, the creation and decay of the body, and the reality of moral virtue as in Bullein's *Dialogue*. A like process will be observable also in the later Eliza-

[11]Tr. Joseph B. Pike as *Frivolities of Courtiers* (Minneapolis, 1938), Bk. II, chap. 29, p. 149. Quoted by W. C. Curry, *Chaucer and the Medieval Sciences* (Oxford, 1926), p. 30.

bethan attacks to be considered hereafter. First, however, some contributory issues may be raised.

The idea of black magic was frequently connected with that of medicine in the Elizabethan mind. Thus the same Doctor Burcot (under the anagram "Tocrub") whom Bullein made the prototype of the Medicus in later editions of the *Dialogue*[12] was described by Reginald Scot's *The Discoverie of Witchcraft* (1584) as trying to buy an attendant demon from a juggler named Feats: ". . . doctor Burcot was brought to Feats, who sold maister Doctor a familiar, whereby he thought to have wrought miracles, or rather to have gained good store of money."[13] Burcot may serve to remind us that there were hundreds of charlatans, self-deceived or otherwise, who made a business of gulling the public, especially in country districts, by performing ostensible deeds of sorcery in connection with medical treatment. Surgeon John Hall's *An Historicall Expostulation against the Beastlye Abusers, Bothe of Chyrurgerie, and Physyke, in oure Tyme* (1565) is full of graphic narratives of this sort, including a story about "one Valentyne" who

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> . . . made the people beleve, that he could tel all thinges present, past, and to come: And the very thoughtes of men, and theyr diseases, by onlye lokinge in theyr faces. When anye came to him wyth urines . . . he made them beleve, that onlye by feling the weight therof, he would tell them all theyr diseases in their bodies, or wythout: And

[12]In the 1564 edition Medicus was at one point given the specific name Antonius Capistranus, which was changed in subsequent editions to "Tocrub." Burcot was a foreign physician who made a large reputation for himself in London as a medical man, alchemist, and magician. In Feb. 1578, he was mentioned in the State Papers (*Cal. S. P., Domestic, 1547-80,* p. 585) as the technician appointed to extract gold from the ore brought back by Frobisher from the New World. He made false and extravagant claims and was accused by his associate named Jonas "of evil manners and ignorance." References to him by Gabriel Harvey (*Marginalia,* p. 158) and Thomas Nashe (*Works,* ed. R. B. McKerrow, IV, 312) were contemptuous, though Henry Chettle gave him a favorable character in *Kind-Hartes Dreame.* He seems to have been typical of the irresponsible and possibly "atheistic" Elizabethan doctor.

[13]P. 144. Also pp. 357 and 522 for further allusions to Burcot as a cheating alchemist and sorcerer. Cf. Nicholas Gyer's *The English Phlebotomy* (1592), sig. A5r, describing quack doctors as "imitatyng doctor Tocrub, with strange lookes, diricks, pricks, crosses, figures, and such foolish fantasies. . . ."

otherwhile made them beleve, that he went to aske councel of the devel, by going a litle asyde, and mumblyng to him selfe, and then comming agayne, would tell them all and more to.[14]

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It is easy to see how exploits like these would create in the popular mind an almost indissoluble association of sorcery with medicine. And a sorcerer, of course, since he sold his soul to the devil and abjured God, was loosely regarded as an atheist of a kind. Nor were these isolated instances. If we may judge by the tremendous volume of complaint uttered by most of the writers of English books on medicine, the state of medical practice in Elizabethan England was abysmally low, and the charlatans who resorted to such magic far outnumbered the respectable practitioners. Doctor Francis Valleriolus estimated in 1562 that "... there be not so few in London as three score women, that occupieth the arte of Phisicke and Chirurgerie. These women, some of them be called wise women, or holie and good women, some of them be called Witches, and useth to call upon certaine spirits, and some of them useth plaine bauderie, and telleth Gentlewomen that cannot beare children how they may have children."[15] And this at a time when, according to the same author, there were only thirty-four true surgeons in the whole of England.

The fact is, of course, that the dividing line between magic and even the more intelligent medicine in this period was still rather dim, though it was in process of clarification. Paracelsus himself, for all his advances in chemical remedies, could believe in the kind of sympathetic magic which applied ointments not to the wound itself but to the weapon that made the wound.[16]

[14]Sig. Aaa4r. See also the case of Robert Harris, sig. Aaa2r. This work by Hall was published in the same volume with his translation of Lanfranc's *Learned Woorke of Chirurgerie* (1565). Cf. Bullein's *Bulwarke* (1562), fol. 6r, for a picture of false chirurgeons: "some of them talketh of Nicromancia, deluding and mocking the people with their knackes, straunge lookes, prickes, domifying, and figuring with soche like fantasies: fainyng that thei have familiers and glasses..."

[15]Thomas Gale's translation of Galen's *Methodus Medendi* (1586) included an essay on "The office of a Chirurgion," apparently written by Valleriolus in 1562. See fols, 33r and 37v.

[16]*Paracelsus of the Supreme Mysteries of Nature*, tr. R. Turner (1656), p. 117.

Against this type of irrationalism the College of Physicians and the Barber-Surgeons' Company strongly set themselves. The record of these organizations as citadels of reaction in other departments of medical theory is not unblemished, but in trying to expel magic from medicine by condemning the use of charms, conjurations, amulets, divinations, exorcisms, and similar superstitions, and by apprehending those practitioners who could be caught, they were treading the path of progress.[17] Nevertheless, the popular belief that a scientist is a sort of devilish magician dies hard. Even the most enlightened of Elizabethan doctors with their Greek, Latin, and Arabian authorities, their learned jargon, strange instruments and stranger drugs, must have been open to suspicion in the public eye. The symbols on the average prescription sent to an Elizabethan apothecary certainly looked like incantations from the infernal regions. And there remained also the human feeling that anybody who knows more than we know cannot be altogether holy.

The Physician as Atheist

The common use of astrology in medicine likewise added its contribution to this feeling. Although it had its defenders, astrology was, as we have seen in Chapter 10, under constant attack by the Elizabethan clergy. Their chief accusation was that by predicting man's future the astrologers were impugning his free will and searching impiously into God's purposes. As a matter of fact, this charge did not apply with any real force to the way in which doctors used their astrology. Physicians seldom tried to predict even the outcome of disease by the courses of the stars. Astrology was chiefly a method helpful in diagnosing the nature of a given disease and in determining the best treatment. Indeed, even in this limited function it was fast losing ground as doctors discovered that attention to the immediate, visible symptoms of the disease and to measures suggested by experience for relieving them yielded better results than elaborate calculations of the positions

[17]Charles Goodall, *The Royal College of Physicians* (1684), pp. 313 ff., gives a detailed story of the efforts of the College to suppress these practices. Also Sidney Young, *The Annals of the Barber-Surgeons of London* (1890), p. 327: "26 Nov., 1605. This day Henry Goodwyn a Sorcerer was by the Masters forbidden to practize any more in the arte of Surgery."

of the heavens at the supposed moment of the patient's birth or of his falling ill. But prejudice, lay or clerical, does not stop to make distinctions, and by a vague process of association medicine would share the odor of impiety which clung about astrology.

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Add the fact that the great Greek fathers of medicine, Aesculapius, Hippocrates, Aristotle, and Galen had been not Christians but pagans, as had likewise the Arabians led by Avicenna and Averroës. This heathen background would not have had so damaging an effect but for the Elizabethan bondage to authority, which evoked endless citation of the opinions of these antecedents in most sixteenth-century medical treatises. Thus Elizabethan doctors seemed to be constantly flaunting the inheritance of their main ideas from a pagan past. The Hippocratic oath itself, often reprinted in their works, begins with an oath upon the god Apollo. So that when Thomas Newton included it in his *Old Mans Dietarie* (1586) he thought it well to advise his reader: "Mervaile not thou at the hethenish names of those putative Gods, by whom hee sweareth . . . but rather feare & tremble, and take thereby occasion to yeeld most humble and hartie thankes unto almightie God for enlightening thee with a better knowledge. . . ."[18] The fame of Averroës the Arabian as both a master physician and a dangerous heresiarch was still alive in Renaissance England, although the scandal thrown upon medicine by its Arabian derivations in the Middle Ages had by this time somewhat died away.[19] Again, Jews had been prominent among the ablest members of the profession ever since medieval times when their knowledge of Arabic opened to them advanced regions of medical thought not yet generally available to Europeans. The blindness and ferocity of Elizabethan prejudice toward them is well known. We may imagine that the execution of Doctor Lopez, a man of Jewish

[18]Sig. D2r. See also Dr. John Securis' *A Detection of the Abuses Committed in Physick* (1566), sig. A2r, where the Hippocratic oath is bowdlerized.

[19]Frederick Tupper, *Types of Society in Medieval Literature* (New York, 1926), pp. 47-49, describes the hatred in which the great Arabian scholar-physicians were held by the orthodox of Chaucer's century. *The Renaissance Philosophy of Man*, ed. E. Cassirer, Paul O. Kristeller, and J. H. Randall, Jr. (Chicago, 1948), pp. 257 ff., with bibliography cited, affords a convenient introduction to Averroistic thought.

antecedents, for a supposed plot to poison Queen Elizabeth in 1594 did not aid the general good name of his profession for probity and piety. Yet Nicholas Gyer tells of one of those quirks of human psychology which made it profitable for quacks to pretend that they were Jewish doctors, "counterfeyting themselves to be Jewes or Egiptians. . . ."[20] The stranger, the outcast, the man of condemned creed, may be the salvation for us to turn to in the desperation of illness.

The Physician as Atheist

But it was Galen, regarded by the Renaissance as the chief founder of medical science, who was the most vulnerable point of all. The other Greeks at least had lived before the Christian era and might be forgiven for their paganism. Galen, however, had flourished in Rome during the second century without adopting Christianity. Worse still, he had doubted the immortality of the soul and had said he thought Christianity lacked demonstration.[21] The English translation of Juan Huarte's famous psychological treatise, *Examen de Ingenios* (1594), described Galen as asking "how it was possible that the reasonable soule should be immortall, seeing it altered so easily with heat, with cold, with moisture, & with drouth: & principally, considering that the same departs from the body through overmuch heat. . . ."[22] Huarte answered that the certainty of immortality "is not gathered from humane reasons" but from faith, and the English translator added in the margin: "Galen dying, went to hell, and saw by experience that materiall fire burned the soules and could not consume them: this Physition had knowledge of that Evangelicall doctrine, and

[20]Sig. A5r. Gabriel Harvey owned a copy of G. Meier's attack on Jewish medicine, *In Judaeorum Medicastrorum Calumnias, & Homicidia; pro Christianis Pia Exhortatio*, 1570 (*Marginalia*, p. 158).

[21]For Galen's real opinions read Lynn Thorndike, "Galen: The Man and His Times," *The Scientific Monthly* (January, 1922), pp. 83-93, esp. p. 93. In his commonplace book Henry Oxinden wrote during the early seventeenth century: "Galen will not approve of the Christian Religion quia demonstratione caret. He was an Atheist." (Folger Shakespeare Library MS 750.1, p. 56). And R. B., (R. Bostocke), *The Difference betwene the Auncient Phisicke . . . and the Latter Phisicke* (1585), speaks of Christ "whom Galene the prince of that phisicke, in his workes hath blasphemed of set purpose and by expresse wordes" (sig. B2r). For the Oxinden reference I am indebted to Ernest Strathmann.

[22]P. 89. Also p. 92.

could not receive it." Somewhat more charitable is the view in Simon Harward's *English Phlebotomy* (1601):

> When Galen doth well, I must needs give him his due commendations, and even admire those singular gifts of nature which God bestowed upon him, but where he skoffeth (as he doth sometimes) at Christianitie, there I detest and abhorre his blasphemies, and leave him to the judgement of that God, to whome only it is knowne, whether ever before his death his heart were better lightened with some beames or sparkles of his grace.[23]

Andreas Laurentius in *A Discourse Of The Preservation Of The Sight* (1599) also disapproved of Galen as an unrepentant champion of the deterministic idea that the condition of the soul simply results from the temperature of the body which it inhabits.[24] In sum, there was widespread sentiment in the Renaissance against Galen as a man who had not only specifically opposed Christianity but had also failed to accept its sharp dualism of body and soul.

On the other side, some Elizabethans found this to say for Galen, that he had been so astonished at the wonderful architecture of the human body that he had been forced to admit a divine architect. This admission on the part of a "prophane & very irreligious Phisitian," as Robert Parsons called him,[25] proved highly useful in several contemporary treatises against atheism as an argument for the existence of God. If even Galen conceded it, who could deny it? Philip de Mornay thought he could actually discern that Galen who "in common account is the most heathenish of al writers" was not a mere materialist after all, for although Galen "laboureth by all meanes possible, to father the causes of all things uppon the Elements, and uppon the mixture of them together" yet in the end he had been driven to declare "that both man and Beast have their beginning from above, and that their soules are from Heaven, and finally that the Soule proceedeth neither from the qualities of the Elements, nor from any of all

[23]Sig. A7v.

[24]Pp. 82-83.

[25]Robert Parsons, *The Seconde Parte of the Booke of Christian Exercise* (1590), p. 50, discussed at length Galen's use of the argument from design. Huarte, p. 34, made the same point, as did Mornay, see n. 26. Cf. also Thomas Gemini, *Compendiosa Totius Anatomiae Delineatio* (1599), sig. A2r.

the things that we see here beneath."[26] In all these writers it is interesting to see the denunciation or defense of Galen revolving around the same materialistic doctrine with regard to the soul which formed the central objective of attack in Bullein's *Dialogue*. There can be small doubt that Galen's personal reputation for atheism was intimately related, both as cause and as effect, to that of the whole Elizabethan medical profession. Elizabethans found irreligion in Galen because they found it in contemporary doctors, and equally discovered it in the latter because they discovered it in their leader, Galen.[27]

The Physician as Atheist

Most Elizabethan physicians, though followers of Galen, certainly did not deserve any such accusation. The great majority of them recognized that disease came from God, but as scientists they felt their main business was with its physical manifestations. The spiritual side they left to the clergy. Thus when Peter Lowe analyzed the causes of venereal disease in his book *Easie, Certaine, and Perfect Method, to Cure and Prevent the Spanish Sicknes* (1596) he began by referring briefly to religious and moral causation and then devoted the whole remainder of his work to the physical level:

> For to refraine the filthy lusts of men and women, God hath permitted thys sicknes to raigne among them, as a punishment for sinne: like as we see in the 6. of Exodus, that he commaunded Moses to cast powder in the ayre, in the presence of Pharao to the effect the beasts and people of Egipt, should be punished and afflicted with Apostums and Ulcers, for their sinnes and disobedience. But because I will not intermedle holy things with prophane, I will not insist further in this matter.[28]

[26]Philip de Mornay, *A Woorke concerning the Trewnesse of the Christian Religion* (1587), p. 169. Idea repeated on pp. 153 and 274, citing chiefly Galen's *De Usu Partium*.

[27]Sig. A3r. Similarly James Godskall objected in *The Kings Medicine For this Present Yeere 1604* (1604), sig. E4r, discussing the causes of plague: "Galens counsaile is, that of al remedies the best is to shun the infected ayre, & to depart in time to the purer aire. But with Galens leave, seeing [E4v] sin is the cause of Physical causes, & that it infecteth the ayre, the best remedy of all (according to the counsaile of the whole colledge of the spirituall Physitions) is to flye from the infectious aire of this world. . . ."

[28]Sig. B1 v.

Hence arose a considerable divergence of emphasis between the two groups. The divines said in effect, "Of course God's wrath expresses itself in bodily symptoms, but we must look to the real cause, which is above the body." And the physicians in turn insisted, "Of course sickness comes ultimately from the Almighty, but prayer alone will not save the patient; our concern is to apply the physical remedies which God himself has afforded." Some of the clerical resentment against doctors undoubtedly came from misunderstanding of this necessary difference in emphasis. But also undoubtedly some doctors extended the emphasis into varying degrees of doubt or contempt of the supernatural element. The range of such variation might, of course, be wide. A doctor who doubted the Christian absolute dualism of body and soul might stop anywhere along the line toward the opposite extreme of materialistic belief that soul is only body, or he might, in many cases, not be very sure exactly what he did believe. This question will be more fully developed in the next chapter.

Unfortunately the whole question of the physician's irreligion was exacerbated and publicized by a civil war within the medical profession in the final decades of the sixteenth century. As soon as the writings of Paracelsus had been widely printed beginning in the 1570's, charges and countercharges of impiety were exchanged by the opposing factions of Paracelsans and Galenists as one phase of the struggle over the theories and methods of the great Swiss innovator. On the Continent Erastus and Aubertus,[29] among others, found heresies in his cloudy theosophies. In England, the initiative came from the Paracelsan R. B., the title of whose book *The difference betwene the Auncient Phisicke, first taught by the godly forefathers . . . and the Latter Phisicke proceeding from Idolaters, Ethnickes, and Heathen: as Gallen, and such other* (1585) shows his method of assault. He took up all the old indictments of the heathenism of Aristotle,

[29]Thomas Erastus, *Disputationum de Medicina Nova P. Paracelsi Pars Prima* (Basel, 1572), and *Jacobi Auberti Vindonis De Metallorum Ortu & Causis contra Chemistas Brevis & Dilucida Explicatio* (Lyons, 1575). Paracelsus, as translated in *Paracelsus his Aurora* (1659), p. 73, had pictured both Galen and Avicenna in hell.

Galen, and the rest, developed them at length, and used them as an argument to discredit accepted medical theory and practice. One of his points, scarcely tenable but repeated with much heat, is that since its origins are pagan Galenic medicine must be bad. But his main effort is to show that the Aristotelian naturalism inherent in this medicine makes it impious. As a compendium of the Elizabethan charges customarily made against orthodox medicine, R. B.'s book is worth examining in some detail.

The Physician as Atheist

He made these principal objections to "the heathenish and false Philosophie of Aristotle": (1) It teaches that the world is eternal, and therefore makes matter equal with God. (2) It denies the Providence of God by conceiving of him merely as a first mover who has set the world running under a system of natural laws with which he does not interfere in any way. (3) It does not teach the soul's immortality. (4) It attributes the generation of man's body simply to a mixture of the qualities of matter:

> So the Phisitions following the Philosophers, doe referre the cause of generation (O God) to a convenient mixture of qualities, which doe worke in the matter ordeyned before . . . yet for all that, they doe not attaine to the first cause thereof. For, the holy Ghost (O God) doth leade us into a higher cause then to nature, then to qualities, and their temperature, when it setteth before us thy worde, O omnipotent God, in which all things are created and conserved. . . . And surely such naturall Philosophie is the next way to make men forget thee, O God, and to become Atheists: for it teacheth men to cleave and sticke fast unto the nature of thinges, not ascending nor considering the Creator: And so it tyeth thee (O God) to the seconde causes, and doth not attribute to thee any actions but according to that nature of things: whereby it doth bewitch men in such sorte, and make their mindes so mad, that they neither do aske neither looke for any good thing at thy hande: for the event and successe of each thing must of necessitie bee answerable to the naturall cause.[30]

R. B.'s indignation here was that Aristotelianism has expelled God from the world, leaving only a machine which runs of itself. Human life then becomes a blind product of this machine not different in kind from its component elements. So remote and

[30]Quoted from the "Obtestation to almightie God" which serves as preface to the book on page preceding sig. A1r.

impotent a Deity, said R. B., is of no interest to men. If they feel that God never interferes with natural processes, they will never pray to him, for what, then, is the use of prayer? In effect, the possibility of direct, spontaneous response by God to the needs of a worshiper is the essence of personal religion.

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R. B. proceeded to tell God at considerable length what the connection is between Aristotle and the Elizabethan doctors who follow Galen:

> And (O mercifull God) because the heathnish Phisicke of Galen, doth depende uppon that heathnish Philosophie of Aristotle . . . therfore is that Phisicke as false and injurious to thine honor and glory, as is the Philosophie. For, that heathnish Phisicke (O God) doth not acknowledge the creation of man, whereby it doth not rightly knowe why he is Microcosmos . . . [and] doth attribute thy workes (O God) to heate, colde, and such causes, which it calleth falsely naturall . . . their Phisicke must needes erre, in not seeking helpe at thy handes, nor praying to thee, nor give thankes to thee. . . .[31]

These accusations throughout were delivered with the exaggeration usual to the special pleader, but they have residuary value as perceptions of a tendency in Elizabethan Galenic medicine.

Another Paracelsan, I. W., in his *Letter Sent by a Learned Physician to his Friend* (1586) carried forward the same line of attack against the Galenists' wandering in "the foggie mists and bogges of Aristotle, Galene etc." Since in chemical learning these infidels "were as blind as beetels, being altogether deprived of such knowledge, unto whom God vouchsafed not to impart the same . . . ," why should any Christian "give more credite unto these wicked Infidels then to his sacred & blessed word?"[32] The Paracelsans, on the contrary, claimed to derive their chemistry straight out of the Mosaic account of Creation.[33] Similar allegations can be found in other Paracelsan works of the period, including the prefaces of John Hester's translation of Paracelsus' *A Hundred and Foure-*

[31]Sig. A5v.

[32]Sigs. B5v and B6r.

[33]See the ingenious interpretation of Genesis in terms of chemical processes by Thomas Tymme, minister, in *A Dialogue Philosophicall* (1612) and the Preface to his translation of Joseph Du Chesne's *The Practise of Chymicall and Hermeticall Physicke* (1605).

teene Experiments and Cures (1596).[34] In truth, the Paracelsans made much more of the religious question than the orthodox Galenists. The former, as the minority party, were fighting indiscriminately with every weapon available against the contempt of their adversaries. Usually the Galenists contented themselves with scorn of Paracelsan scientific ignorance.[35] Occasionally, however, they repeated the continental reflections upon the orthodoxy of Paracelsus himself. Thus both R. B. and I. W. felt obliged to defend their leader against charges of witchcraft and heresy involving the belief that matter was eternal.[36] In *A Breefe Aunswere of Josephus Quercetanus*, translated by John Hester in 1591, Du Chesne admitted that he could not countenance the religious aberrations of Paracelsus but still championed him as a great chemist.[37] And as late as 1625 Thomas Jackson's *A Treatise Containing the Originall of Unbeliefe*, noting that the Swiss doctor had been accused of Arianism by Erastus, admonished that he should be read only "by mindes throughly grounded in the orthodoxicall faith."[38]

The Physician as Atheist

In the main, however, it is true that by the beginning of the seventeenth century both sides seem more or less to have dropped the religious issues in the controversy and concentrated instead on its purely scientific aspects. By that time it had become clear to men of moderation in both factions that a doctor might believe in chemical medicines without believing in the overturn of all religion, or in Galen and Aristotle without being a black-hearted worshiper of heathen idols. The prominent surgeon William Clowes summed it up with wholesome common sense in his *Treatise for the Artificiall Cure of Struma* (1602):

[34]Sig. A3r. See Paul H. Kocher, "John Hester, Paracelsan," *Joseph Quincy Adams Memorial Studies* (Washington, 1948), pp. 621-38.

[35]But John Oberndoerffer, *The Anatomyes of the True Physition, and Counterfeit Mounte-banke* (1602), p. 9, seems to lump Paracelsans in with the mountebanks of whom it questions: "... where shal you finde anyone in this Crew, who hath any spark of Religion, or drop of Charitie ...? But to speake plaine ... the greatest part of this Packe, are no better than ranke and arrant Atheists."

[36]See R. B., chap. 20 and sig L3r, and I. W., sig. A1v.

[37]Fol. 1v.

[38]Pp. 182-84.

. . . if I finde (eyther by reason or experience) any thing that may be to the good of the Patients, and better increase of my knowledge & skil in the Arte of Chirurgery, be it eyther in Galen or Paracelsus; yea, Turke, Jewe, or any other Infidell: I will not refuse it, but be thankefull to God for the same. How be it, I will in no wise meddle with their Infidelity, though I embrace their knowledge and skill in humane verityes and inventions. . . .[39]

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Nevertheless, the flurry of religious denunciations in the Paracelsan controversy during the last two decades of the sixteenth century must have confirmed bystanders in the opinion that there was something dangerously impious about the whole medical tribe.

To what extent was this opinion really justified? How large was the proportion of Elizabethan doctors assailed by religious doubts, and in what degree? Obviously there can never be any definite answers. The subtle shadings of unbelief in the individual mind are not matter for statistics even if we had full records of every kind for the period in question. And of course we have not. In an age when the penalties for unorthodoxy were severe, physicians did not go about proclaiming their infidelity, certainly not in print. We must do what we can with a rough, general impression.

No Elizabethan doctor, as far as I can discover, was publicly tried for atheism. When Doctor John Caius was accused of this crime by the fellows of Caius College, Archbishop Parker was bothered, but Lord Burleigh did not even trouble to investigate the charges.[40] In fact, Caius seems to have been a devout Catholic. The Royal College of Physicians, which acted as censor to the morals and practice of the profession, sometimes castigated the use of sorcery but never, so far as a sampling of its records indi-

[39]Sig. A2v. See also in William Clowes, *A Prooved Practise for all Young Chirurgians* (1588), sig. A1v, this salty comment on a Paracelsan: "This fellow is so wise in his owne conceit, that he renounceth to follow the method and wayes of curing, after Hippocrates and Galen, because they were Heathen men. I aunswere with the sayings of the godly, wise, and learned, that he which is a Christian, will live as a Christian, and yet may take Physick and Surgery of a Jew, if he have skill."

[40]*Correspondence of Archbishop Parker,* ed. Bruce and Perowne (1853), Parker Society, XXXIII, 251-52; *Workes of John Caius,* ed. E. S. Roberts (Cambridge, 1912), pp. 23, 39.

cates, haled any doctor before it for atheism.[41] In popular diatribes against medical men, atheism is seldom given an important place, the whole criticism usually being directed at their professional incompetence, covetousness, and general immorality.[42] This, however, reflected indirectly on their religious status. To defame a group as persistently guilty of gross immorality in the Elizabethan era was halfway toward challenging their religious faith, because an evil life was thought to be characteristic of those whose belief in God was weak or nonexistent—for example, recall Medicus in Bullein's *Dialogue.*

The Physician as Atheist

Likewise in the theological treatises on atheism the specific mention of doctors is usually limited to a caveat or two about Galen. Sometimes they may be included with other scientists in a general condemnation of the arrogant searching of natural secrets, as in La Primaudaye's *French Academie:* "There are others also no lesse hurtfull, who have beene such curious Inquisitors of the causes of all naturall things, that through frivolous and unprofitable questions they have fallen into that impietie, as to seeke for another beginning of all things, than God. Whereupon this proverbe, which is too true, arose, *Of three Physitions one Atheist.* This kinde of curiositie, is of all others most pernitious."[43] It is perhaps fair to say that of all Renaissance scientists doctors had the worst reputation for impiety. But one should go on to add that scientists in general were not usually given a place anywhere near the top of the roster of the impious. Politicians and Epicurean bons vivants held this favored location. In full-scale

[41]Goodall, passim.

[42]E.g., Pedro Mexia, *A Pleasaunt Dialogue concerning Phisicke and Phisitions* (1580); Simion Grahame, *The Anatomie of Humors* (1609), fols. 24-26. M. Yearsley, *Doctors in Elizabethan Drama* (1933), quotes reams of miscellaneous abuse of physicians by contemporary dramatists, but only one instance of a charge of atheism (p. 18). Gyer, sigs. A2r & v, has a good account showing how dishonest practice by medical impostors reflected on the honesty of the whole profession.

[43]Pt. I (1594), pp. 152-53. La Primaudaye's reduction of the proportion of atheists among doctors from two-thirds to one-third may mean only that he misquoted the medieval proverb or else that he thought the former figure excessive. For another broad attack on science as producing irreligion, read Thomas Jackson, *A Treatise Containing the Originall of Unbeliefe,* pp. 36, 45, 67.

works on atheism like Mornay's *Trewnesse of Christian Religion* (1587), Parsons' *Booke of Christian Exercise* (1590), John Dove's *Confutation of Atheisme* (1605), and Martin Fotherby's *Atheomastix* (1622), science was far more often cited as proving God's existence than as disproving it, under the staple argument that study of the marvelous structure of the universe led man's mind to see that it must have had a Creator.[44] The full impact of the Copernican hypothesis on religion did not strike England until after 1600. All in all, science was not yet the paramount source of danger to religious piety that it afterwards became.

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In short, there is a good deal of negative evidence to be balanced off against the positive intimations of Bullein, R. B., and others that irreligion was plentiful among Elizabethan doctors. The matter is elusive. Perhaps the safest conclusion is that there was some tendency to materialistic speculation among them but that it did not often take the extreme forms sometimes attributed to it.

We shall stress in the next chapter that Elizabethan medical literature was, on the whole, notably pious in tone. Nevertheless, it showed some disposition to minimize and reduce the actual instances of God's intervention in the workings of the human body and its surroundings. There had to be such a disposition. Science is predictability. Unless the normal future course of a disease can be predicted and regulated by natural means, there can be no medical science. If God or the devil keeps coming in with miracles, demonic possessions, or other supernatural manifestations the physician might as well call in the priest and go his way. So the unremitting pressure of Elizabethan medical science was toward admission in theory that there might be divine intervention but action in practice as if there were none. Most contemporary medical treatises can be searched in vain for actual case histories in which the physician concedes that he is confronted by a preternatural condition in his patient.

As we have already seen in Chapter 6, by the end of the sixteenth century the idea of the devil had been pretty well washed out

[44]E.g., Dove, pp. 20-26; Fotherby, pp. 173 ff.; Parsons, pp. 31-36; Mornay, sigs. A1r ff.

of the medical books, and the idea of God was being subjected to a subtle, chiefly unconscious process of erosion. The idea of the divine acting on the human body was being gradually pushed outwards toward both ends of the life cycle, birth and death, leaving life itself as a purely natural phenomenon proceeding under regular laws which the physician thought he could predict and take advantage of. This was the tendency to "tie God to second causes" to which Bullein and R. B. so vehemently objected. And as they asserted, no doubt there were a few physicians who, arguing from their success in explaining the phenomena of health and disease on this purely physical basis, extended its full scope into an over-all materialism and denial that there was any God beyond it. In particular, as the apologists for religion pointed out, such a materialism would affect the doctor's view of the creation and destiny of the soul.

The Physician as Atheist

The guardians of religion in the sixteenth century were therefore concerned with the beginnings of an encroachment which has proceeded far in our own time and is perhaps already receding. The assumption underlying our scientific method has been a materialistic, mechanistic universe developing solely according to reasonably foreseeable laws, either absolute or statistical. We have been told by E. A. Burtt and others how this assumption has come to be tacitly regarded as if it were, instead, a proved conclusion. Permeating our thought, it has caused us to believe either in no God at all or in one who acts upon us at so distant a remove and through so complex a system of natural order that we feel no direct relationship with him. Diluted, philosophic religion may satisfy a few. But most people need, it would seem, a sense of personal immediacy, entailing the favor, protection, anger, or command of the Deity, if they are to accept any religion at all. Hence the weakness of modern religion. In our own day the causes of this weakness have often been explored. But fundamentally the same analysis was already being made in the sixteenth century by the critics of the materialism of the medical atheist.

13

God in Medicine

WHEN Christianity conquered the ancient world, it faced the problem of absorbing, along with other pagan learning, a system of Greco-Roman medicine which had become fairly well divorced from any type of religious thought. Positivism was the keynote of this system. Its practitioners, whatever their personal beliefs about the meaning of the universe, inclined to treat health and disease strictly as matters of natural cause and effect. This conscious pulling in of horizons occurred as early as the writings of the Hippocratic school. The tenor of even such a work as *The Sacred Disease* was that no disease was peculiarly holy or more immediately derived from the gods than any other. All were equally susceptible of natural explanation in terms of causation by climate and bodily constitution. Aristotle and Galen admitted God as the supreme architect of anatomy and physiology but not as the adjudicator of sickness and health. The comprehensive survey *De Medicina* by the Roman writer Cornelius Celsus traversed the whole field without once accepting a supernatural agent in medical events. In the Christian theocracy, where everything had to be subordinated to theology, what was needed was a way of incorporating the obviously useful findings of pagan medicine into a strictly Christian context. That context was provided mainly by the Bible itself, which emphatically established disease as a function of the wrath of God, healing medicines as a function of his mercy, and the physician as his instrument.

On this general basis a firm integration of all pagan medical learning (including the accretions of Arabic science) with the Christian world-view was achieved during the great period of synthesis in the Middle Ages. One can see the results in such

medieval works as Lanfranc's *Chirurgerie*, John of Arderne's *Treatise of Fistula in Ano*, and Guido de Cauliaco's *Cyrurgia*. The religious rationalization of medicine there founded was passed on without change to Elizabethan writers, both clerical and scientific. We shall see presently that these two groups differed somewhat in the emphasis they assigned to different parts of the theory. But mainly it was satisfactory to both. The clergy were of course committed to keeping medicine, as one important field of human knowledge and practice, closely tied to theology. And the doctors, too, were most of them pious men who took encouragement from the belief that their work was ordained of God and divinely directed to the relief of man's suffering.

God in Medicine

I

Precisely what, then, were the details of this theology of medicine? The first proposition was that man's body, the most exquisite of all physical fabrications, reveals the divine genius of its architect. As God's goodness

> is most manifestly and chiefly declared unto us by holye scripture. . . . Even so secondarily as a sensible glasse, maye we beholde the same his goodnesse, wysdome, and providence, in the framinge of the bodie of man with the use of the parts therof as it were in a secreate shoppe and forge of his marvelous woorkmanshippe.[1]

Indeed, one of the chief reasons for studying human anatomy is that it leads to appreciation of God's greatness as a builder.[2] Every part of the body is perfectly designed for its appropriate purpose. Consider, for example, "how fit to apprehend are the handes, and how prompt to move are the fingers. . . ."[3] In the same way, the head admirably protects the brain and gives a commanding location to the eyes, and so on. Thus the argument from design

[1] Thomas Gemini, *Compendiosa Totius Anatomiae Delineatio* (1559), sig. A2r of the Dedication. Similarly, Andreas Laurentius, *A Discourse of the Preservation of the Sight* (1599), pp. 15-16.

[2] John de Vigo, *The Most Excellent Worckes of Chirurgery* (1550), fol. 1r.

[3] John Banister, *The Historie of Man* (1578), fol. 31r; Thomas Vicary, *The Englishemans Treasure* (1586), pp. 15-17. Such teleological interpretations of anatomy had been frequent in Galen.

exhibited in man's body is an unanswerable refutation of atheism.[4] Of course this masterpiece of the celestial craftsman is corrupted by disease and death, but these are results of man's own sin through Adam. Corruptions of this sort, though they may spoil the workings of the soul in the body, never affect the soul itself, which remains untouched through all physical vicissitudes and departs when the body dies.

Secondly, God has foreseen man's need of medicines and has mercifully stored the earth with medicinal properties for his healing. Witness

> . . . herbes, trees, stones, mettals, mineralls, beastes, foules, fishes, and all other things, that crepeth on the face of the earth, which hath receved of the high and mightie Lorde, both qualities, and properties to helpe, and cure, most grevous diseases, being rightly aplied and used, according to reason & experience. . . .[5]

By a divine instinct sick or wounded animals seek out those herbs which will do them good, but man, with God's aid, must carry on the search for medicine by observation and reason.

Thirdly, God sends the physician to discover and administer these remedies implanted in nature. Adam was originally gifted with a complete knowledge of materia medica, but when this was lost through the Fall[6] the Lord raised up a long series of historical physicians, beginning with some of the Biblical patriarchs and continuing on through supposed heathen gods like Apollo and Aesculapius, who were really actual men, down to Hippocrates and Galen and beyond, to resuscitate this lost knowledge.

[4]Thomas Tymme, *A Dialogue Philosophicall* (1612), "To the Reader." In books against atheism the argument from the design of the human body was often used as proof of the existence of God. See Philip de Mornay, *The Trewnesse of the Christian Religion* (1587), p. 7; Robert Parsons, *The Second Parte of the Booke of Christian Exercise* (1590), p. 36; John Dove, *A Confutation of Atheisme* (1605), pp. 22-27. From these citations and those in the preceding three footnotes it is clear that medical research was not generally labeled as the sin of curiosity or made widely subject to theological censure in England.

[5]Thomas Gale, *A Briefe Declaration of the Worthy Arte of Medicine*, prefacing his tr. of *Certaine Workes of Galens* (1586), sig. A1r. Also William Bullein, *Bulwarke of Defence against all Sicknes* (1562), sig. iir; Timothy Bright, *The Sufficiencie of English Medicines* (1580), pp. 9, 23.

[6]Tymme, loc. cit.

Which thing Jesus the sonne of Sirach the wisest among the Jewes, hath confirmed saying: Honor the Physition with the honnor due unto him, for the most High hath created him because of necessity: and of the Lord commeth the gift of healing. The Lord hath created Medicines of the Earth and he that is wise will not abhorre them.[7]

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Physicians, therefore, are emissaries of the Almighty in the exploration of the natural causes of disease and the treatment of the sick.[8]

But, a fourth proposition, God provides not only the human body, the physician, and the medicine; he provides also the disease to punish man's wickedness. If human maladies increase daily it is because they are "ever the just vengeance of God falling upon us for greate abhominations, and without doubt will evermore endure, unless we do repent and live in his commaundements."[9] All infirmities come equally from God, but the great epidemics most clearly signify his wrath. And all come usually through the ordinary channels of nature, though the possibility of direct infliction by God without ordinary means must always be reserved.

Hence a final proposition that God likewise determines the outcome of each sickness in the individual patient. The doctor must humbly recognize that he is a servant of the divine will. Since the primary cause of disease is supernatural, the first remedy must be prayer and moral reform, but since the supernatural works usually through the natural, physical remedies also must be applied:

[7]Ambroise Paré, *Workes* (1634), Preface, sig. A2r. Other good accounts of the religious history of medicine were given by Jacques Guillemeau, *The French Chirurgerye* (Dort, 1597), fol. 1r & v; Christopher Wirtzung, *The General Practise of Physicke* (1605), pp. 1-5; Peter Lowe, *The Whole Course of Chirurgerie* (1597), sig. B1r & v; John Banister, *A Needefull Treatise of Chyrurgerie* (1575), fols. 2r ff. of the Epistle Dedicatory.

[8]John Cotta, *A Short Discoverie of Ignorant Practisers of Phisicke* (1619), p. 120: "And thus must the true physition ever behold God as his guide, and be governed and directed by his hand. For God is nature above nature, and nature is his hand and subordinate power: God being therefore the cause of causes in nature, he is the giver of health and life in nature, and the Physition is his servant and minister therein."

[9]Thomas Phayre, Preface to *A Treatise of the Pestilence* appended to Jehan Goeurot's *The Regiment of Life* (1596), sig. L1r. Also Bullein, *Regiment againste Pleurisi* (1562), sigs. A4v ff.; Simon Kellwaye, *A Defensative against the Plague* (1593), fol. 1v.

... in the time of Pestilence, Penitencie and Confession are to be preferred before all other Medicaments, and withall to change the place for a more pure ayre.[10]

Science and Religion in Elizabethan England

God has set in advance a death hour for each man. If this has arrived, "no man by no art nor science can not prolonge the time: for the nomber of monthes and dayes of mans lyfe God knoweth."[11] Inasmuch, however, as no man can guess in advance whether the destined death hour is at hand, the doctor is always bound to do his best to preserve life.

By these various ligatures medicine was bound very closely to theology. Indeed the connections could not well have been much tighter. Completely dominating medicine, God was regarded as the source of the human body, of all medical materials, of the physician's knowledge, of the disease itself, and of its final event. So ran the generally accepted theory. Yet the most important thing about a theory is not that it exists but how it exists, how it is interpreted, contorted, utilized, or avoided by actual classes of people under particular circumstances.

II

Briefly, the whole doctrine was regarded as false and dangerous by two small groups of extremists on opposite sides of the issue. On what might be called the far right wing were the Elizabethan mystics and ascetics, the ultra-religionists who despised worldly life as a clog upon the union of the soul with God. For them, man's body was vile.[12] Prolonged study for its health could lead only away from the single essential care of salvation, if not into perilous

[10]Thomas Vicary, *The English Mans Treasure* (1633), p. 250. Similarly, Thomas Moulton, *Myrrour of Helth* (1550?), sigs. A8v, B5r ff.

[11]Andrew Boorde, *The Breviary of Healthe* (1552), fol. vir. Warde's epistles to Alessio's *Secretes* (1568), fol. 2v; Bullein, *Dialogue against the Fever Pestilence* (1564), fol. 77r.

[12]See, typically, T. R., *The Anatomie of the Minde* (1576), Preface to the Reader; and contrast Nicholas Gyer, *The English Phlebotomy* (1592), sig. A3r. Gemini, sig. A1r of the Dedication, inveighed against those who "when they heare or reade certein wordes of holy scripture speakynge against the fleshe and the worlde, do greatly mistake those woordes and folyshly dyspise and contemne the marvelous creatours of God wherin shyneth the poure and wysdome of his invisible deitie..."

curiosity about God's secrets. Men of this otherworldly temper tended strongly to reject or minimize the natural causation and treatment of disease in favor of the supernatural. Later on we shall see how this attitude issued in the sect of so-called "Stoical Christians," who denied that plague was infectious. It did not suffice, however, to overcome the more practical and worldly strain featuring most Elizabethan religion, and so remained a minor element.

God in Medicine

On the extreme left wing can be distinguished a small fringe of medical men who had become either outright atheists or at least disbelievers in the Christian concept of Providence. Their direction was towards complete materialism which ruled out altogether any supernatural explanation of what happened to the body. In their eyes, disease was a purely natural phenomenon capable of being dealt with by a positivistic method only. We remember how William Bullein's *Dialogue against the Fever Pestilence* (1564) satirized this view in the person of a Medicus who worshiped Aristotle instead of God and denied the dualism of body and soul.[13] It seems quite unlikely, however, that many Elizabethan doctors really put out of their minds the belief in God as working behind all the physical appearances of illness. The medical writings of the period bear convincing witness to the fidelity of the great majority of doctors to this belief, though with many fine gradations of stress.

Let us look at some concrete instances. The most devout among contemporary medical works were likely to lean upon religion not merely in their prefaces but pervasively throughout their texts, sometimes culminating in a closing prayer for divine aid. So ardent is the tone as to leave no doubt of its genuineness of feeling. Books of William Clowes, the prominent surgeon, may serve as good examples. Both the Epistle and the opening pages of the text of his *Treatise of the Disease called Morbus Gallicus* (1585) admonish the reader that sexual disease is God's punish-

[13]Fols. 6v-8v, 24r & v, 38r, etc. For other references, see preceding chapter and Owsei Temkin, "Medicine and the Problem of Moral Responsibility," *Bulletin of the History of Medicine,* XXIII (1949), 1-20.

ment for the sin of lust. Medical treatment does no good unless the victim intends to live honestly thereafter, for otherwise God "will bring a currse upon the verie medicines, and take away the benefit of healing, by that meanes." Clowes then narrates case histories of cures he has wrought through fumigation and rubbing with a mercury ointment, often adding that they succeeded "through the helpe of almightie God, to whome be all glory for ever. Amen." And he concludes the work with a fervent prayer to God to bless the physician's labors.

Likewise from Clowes' other books, *A Prooved Practise for all Young Chirurgians* (1588), *A Profitable and Necessarie Booke of Observations* (1596) and *Treatise for the Artificial Cure of Struma* (1602), it is clear that he was a devout man who bore his religion constantly in mind while practicing surgery. The works of William Bullein, John Woodall, and Thomas Gale are other examples of the intense penetration of medical writing by religious feeling. A number of additional books might be classified as warmly pious throughout, but on the whole they remained a minority group. Lest there be any attempt to correlate piety with lack of ability, we should remark that the men just named were among the ablest of the Elizabethan physicians and surgeons.

The average Elizabethan work on medicine or surgery is much less intent on religion. It normally makes a pious reference or two in the preface and dedicatory epistle, but when it buckles down to the business of medical analysis is likely to forget the supernatural, except for a possible passing allusion now and then. Thus John Banister's *A Needefull Treatise of Chyrurgerie* (1575) in its two Epistles Dedicatory cites Ecclesiasticus against the maligners of the medical profession and allots two pages to God's sending of medicines to men, but in its actual text gives over a hundred pages to discussing types, causes, and treatment of ulcers without once mentioning supernatural cause or supernatural cure. Philip Barrough's *The Method of Phisick* (1596) describes the causes and treatment of hundreds of ailments as if no God existed, with but two exceptions: the supernatural as well as the natural origins of pestilence are admitted in the section on this disease (pp. 246-

54), and the religious justification for the physician's right to search the secrets of nature is stated in the preface. In books of this kind religion becomes largely a prolegomenon and an appendix to medicine. The majority of Elizabethan medical publications fall loosely within this general class.[14]

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Then there is also a smaller class of treatises in which religion does not appear at all, or so infinitesimally as to be negligible. Several books of prescriptions for miscellaneous infirmities, like John de Vigo's *Lytell Practyce in Medycyne* (early black letter, n.d.) and John Banister's *An Antidotarie Chyrurgicall* (1589), are quite devoid of religious reference. John Caius gave his entire *A Boke against the Disease Commonly Called the Sweate* (1552), to a scientific commentary on the sickness as a thing of this world, not alluding to God until the very last sentence, couched in the conditional: "If other causes ther be supernatural, theim I leve to the divines to serche, and the diseases thereof to cure, as a matter with out the compasse of my facultie." So conscious and explicit an exclusion of religion from medicine, however, is not usually to be found even in books of this general type, where the omission is usually silent and no doubt often unpremeditated.[15]

Recognizing always that the foregoing triple grouping of medical works cannot be rigid and that each book has its own peculiar quality of religious tone depending on the relative length, ardor, frequency, context, and subject-matter of its embodiments of accepted religious theory, we can still conclude that Elizabethan medical literature in the mass tried loyally but perhaps a little perfunctorily to maintain some recognition of God's role in

[14]Other samples: Thomas Newton, *The Olde-mans Dietarie* (1586); Leonardo Fioravanti, *A Short Discours uppon Chirurgerie* (1580); Peter Levens, *The Path-way to Health* (1632; 1st ed. 1587); Thomas Rainold, *Compendius Declaration of a Certain Lateli Invented Oile* (1551); Andrew Boorde, *A Regimente of Health* (1562).

[15]Other books of this type: Walter Cary, *The Hammer for the Stone* (1581); A. T., *A Rich Store-house for the Diseased* (1596); *The Englishmans Doctor* (1607). The able work of Christopher Langton. *A Treatise Declaring the Principal Partes of Phisick* (1547), Bk. III, chap. 1, even discusses the causes of disease without including the supernatural. George Baker's works on medical chemistry and William Harvey's revolutionary *De Motu Cordis* are in this category.

disease. The average Elizabethan writer on the subject preferred to reserve this recognition of the larger religious significations of his work for his prefaces and to keep his feet on the common earth when giving the actual medical information. Noteworthy also is the fact that books on plague and other devastating epidemics have on the whole a much deeper religious tone than books on non-epidemic infirmities. Devout feelings of the Elizabethan people clustered more passionately around these great universal diseases which seemed like overwhelmingly fearful revelations of the wrath of God. They were a natural focus of piety to which the sentiments of the doctors themselves appear to have gravitated quite genuinely. Without these large numbers of pestilence books, and sections on pestilence in general compendiums, the medical literature of the epoch would undoubtedly have been considerably more secular than it is.

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III

There remains the question whether this literature favors some portions of the theology of medicine more than others, and if so, in what ways and for what reasons. The conclusions will be clear that medical writers sometimes had motives other than spotless piety in using religious theory and that there were certain tensions between them and the religionists who made up the bulk of the theological school.

Of the five main propositions which, on an earlier page, were described as constituting the theology of medicine, the first three justified medicine whereas the last two tended to make claims upon it. The divine craftsmanship of the human body, the divine intention that all nature should be explored for its medicinal properties, and the divine commission to doctors to apply and extend the healing art were all clear encouragements to medical science. On the other hand, God's control over the coming of disease and over its healing were, under some interpretations, limiting factors upon medicine. Obviously the writers of medical works felt a good deal more ease and zest in using what was encouraging than what was constricting, and governed their selections accordingly.

The religious justification of medicine was, indeed, their chief rock of defense against the perpetual and widespread attacks leveled against the profession during this era. If preachers accused medical science of atheism, they might be answered with a quotation from Guido de Cauliaco or almost any subsequent work on anatomy, that among the reasons for studying the human body "The first and greatest is for the mervayle of the great power of God the creator of men, that so hath made them to his lykenesse and forme."[16] If other preachers spoke of the danger to the soul in knowing too much about the world, they could be confronted with the text from Ecclesiasticus 38 that God created medicines of the earth, and the inference, as in John Banister's *The Historie of Man* (1578):

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> In fine, there is nothing so highe in the heavens above, nothing so low in the earth beneath, nothing so profound in the bowels of Arte, nor any thing so hid in the secretes of nature, as that good will dare not enterprise, search, unclose, or discover.[17]

If the derisive word went round among the people that doctors killed more than they cured and that they were the only murderers privileged to bury their dead without penalty of law, it was comforting to be able to point to the long religious history of medicine since the days of Adam and remark that Christ and his apostles were healers.[18] The doctors themselves were very sensitive about the abominable state of medical practice in England at the time because of its infestation by droves of quacks and sorcerers unchecked by a licensing system. Ecclesiasticus 38 is

[16] *Guydos Questions* (1579), fol. 5v; Vigo, *Chirurgery,* chap. 1, fol. 1r.

[17] Sig. A2r. Also Bullein, *Bulwarke* (1562), sig. iir: "There is nothyng so secrete hidden, within the minerals of the yearth, or lurkyng so lowe under the floodes of the sea: but by meanes and policie, thei are brought to use. Their names, qualities, and natures, are knowen, unto the wittie hedde of mankinde, to this ende, to helpe mankinde, in the tyme of his bodily infirmitie. These God hath ordained by his divine providence, that every creature sencible and insencible, should serve his beste creature, mankinde." Similarly, Dove, p. 26; Gyer, sig. A3v; Barrough, *The Method of Phisick* (1596), sig. A4r.

[18] See the defenses of medicine in Thomas Gale's Preface to *Certaine Workes of Galens* (1586); Pedro Mexia, *A Pleasant Dialogue concerning Phisicke and Phisitians* (1580); Erasmus, *Prayse of Phisyke* (n.d.).

undoubtedly the scriptural text most zealously cited in contemporary medical books.[19]

We may emphasize also that these same religious ideas could be, and were, used by the Paracelsans and others in support of their new discoveries. If anything, the Paracelsans invoked God more often than did the rival Galenists. In his *Compendious Declaration of the Excellent Vertues of a Certain Lateli Invented Oile* (1561) Thomas Rainold argued that

> . . . it can not be trueli denied, but that in this oure time god hath stearid up excellent vertuous witts whiche so straitli call to examination al the doctrine and documents lefft from the auncients, waieng, & so advisidlie trieng, the sincere from the contrarie, that if thei procead as thei have begun, it is like within feu yeares, that science will be so renuid, refreshid, and purgid, that thei whiche hitherto have boren al the bruit, & have obtainid all autorite, wil leese a greate portion of there creadit. . . .[20]

John Hester was the center of early Paracelsan activity in England.[21] Not only in his independent works, like *The Key of Philosophie* (1596) and *The Pearle of Practise* (1594), but also in his translations of Paracelsus, Du Chesne, and Fioravanti, he relied constantly on the idea that God intended the Paracelsans to advance medical science. It could never have been the divine will that all progress should cease with Galen and Avicenna. Especially in new diseases like syphilis, which was unknown to the ancients, God was revealing new remedies to mankind through the Paracelsans. No matter how unpopular these remedies might be at first with the orthodox Galenists it was the Christian duty of each Paracelsan to publish them lest he be guilty of hiding his talent.

[19]See John Hall's epistle to his translation of Lanfranc, *Excellent Woorke of Chirurgerie* (1565), fol. ii r; John Securis, *A Detection of the Daily Abuses Committed in Physick* (1566), sig. D3r; Bullein, *Government of Health* (1595), fol. 3r.

[20]Sig. B3v-4r. A like defense of Paracelsan medicine is made by William Vaughan, *Naturall And Artificiall Directions for Health* (1600), p. 67; Francis Anthony, *The Apologie of Aurum Potabile* (1616), p. 19. See also Thomas Tymme's forespeech to Joseph Du Chesne, *The Practise Of Chymicall and Hermeticall Physicke* (1605), fol. 1 v.

[21]See Kocher, "John Hester, Paracelsan" in *Joseph Quincy Adams Memorial Studies*, pp. 621-38; and "Paracelsan Medicine in England," *Journal of the History of Medicine*, II (1948), 451-80.

In this way, comparable to the way in which the explorers of the New World found a religious incentive for their hardships, the new chemists were encouraged to go on with their work. It is certainly wrong to think of Elizabethan religion as inhibiting new ideas in medicine.

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The case was different when it came to those parts of the theology of medicine which announced God as the ultimate source of bodily weal and woe. Here the problem was to reconcile this doctrine with a science of medicine which, if it was to be a science at all, had to be able to depend on an order of nature at least relatively predictable. General recourse was therefore had in medical thinking to the view that when God acted upon man's body he did so by natural means. But let us see how this view was actually applied in concrete cases.

As regards the divine origin of all physical ailments, most medical writers did not bother to mention it except in discussions of plague and venereal disease. Wounds, fractures, agues, dropsies, and the like were analyzed solely according to natural origins. For example, William Clowes made much of the supernatural cause of syphilis in his book *Morbus Gallicus* (1585) but said nothing about God's sending the wounds, ulcers, and tumors he described in his books on surgery. Walter Cary in *Farewell to Physicke* (1583) wrote of headache, sore eyes, heartburn, rheum in the lungs, and so on, but only in his chapter on plague listed a supernatural as well as a natural reason for the sickness.[22] Apparently, the lesser and more obvious infirmities did not carry the mysterious horror which, in the case of pestilence, led men's thoughts to God, or the moral obloquy which, in the case of syphilis, produced the same result.

Where plague was concerned, medical writers were fairly unanimous in recognizing the supramundane element. But their general disposition was to give it far less space than they gave to mundane

[22]Cary's discussion of plague covered pp. 45-50, but he gave only half of page 46 to the supernatural. In the same class was Petrus Valentinus, *Enchiridion Medicum* (1612), a 72-page general survey of medicine which brought in the supernatural only in one sentence of its two-page essay on plague (p. 60); John Jones, *A Diall for All Agues* (1566), sigs. F7v ff.

explanation, and a far inferior emphasis. In Thomas Elyot's *The Castell of Helth* (1572), a fairly pious document, four pages are set aside for the solely naturalistic explanation of plague and only this final sentence for the other: "But here I alwaye except the power of God, which is wonderful, and also mercifull, above mans reason or counsell, preserving or stryking whome, whan, and where it shall like his majestie, to whome bee glory and prayse everlasting. Amen." (fol. 95v) Elyot evidently regarded the supernatural as something unaccountable, apart from and superimposed upon the natural, with which it was not his function to deal in a book on medicine. In the same way, Philip Barrough's *The Method of Phisick* (1596) offers only a grudging welcome to the idea in this one sentence of his eight-page discussion of plague:

> Also we doe not deny, but that sometime great plagues & pestilence be sent of God for the grievous sinnes and horrible offences of men, wherewith he punisheth the great offences of us: whereof there be many evident testimonies in the Prophets, and specially in Ezechiel cap. 5.[23]

In many another such treatise, God's intervention was similarly reduced to an "also" which doctors "doe not deny" but do not exert themselves to affirm either.[24] It was something to be admitted at the outset and thereafter, in effect, ignored. It belonged mainly to the province of the theologian, who was a specialist in such matters and might be expected to know what to do about them. In truth there was nothing much that doctors, as doctors, could contribute in that field. They were specialists in the natural. Thus a distinct practical separation of medicine from religion inevitably obtained in the Elizabethan age, however close their assimilation in theory.

The point which medical writings were chiefly concerned to bring out was that when God sent pestilence he did so by natural

[23]P. 247. His full analysis of plague occupies pp. 246-54. Similarly, Peter Turner, *Concerning Amulets or Plague Cakes* (1603), esp. p. 10.

[24]This is true, though in somewhat lesser degree, even of the more pious medical works on plague, e.g., Thomas Lodge, *A Treatise of the Plague* (1603); Simon Kellwaye, *A Defensative against the Plague* (1593); and Christopher Wirtzung, *The General Practise of Physicke* (1605), pp. 653 ff.

means, like the influence of planets, weather, corrupted air or unwholesome humors in the body. To these man might add by dissipation and bad diet ruinous to his constitution. But God did not often bypass or pervert the normal order of nature through direct, unintermediated, miraculous inflictions of disease. This struggle of the medical writer to assert both the ordinary inviolability of natural law and the possibility of its violation on extraordinary occasions by God stands out vividly in Ambroise Paré. God, he said, is

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> . . . the beginning and cause of the second causes, which cannot well without the first cause goe about nor attempt, much lesse performe any thing. For from hence they borrow their force, order, and constancy of order; so that they serve as Instruments for God, who rules and governes us, and the whole World, to performe all his workes, by that constant course of order, which hee hath appointed unchangeable from the beginning. Wherefore all the cause of a plague is not to bee attributed to these neere and inferiour causes or beginnings . . . On the contrary, wee ought to think . . . That even as God by his omnipotent Power hath created all things of nothing, so he by his eternall Wisedome preserves and governes the same, leads and enclines them as he pleaseth, yea verily at his pleasure changeth their order, and the whole course of Nature.
>
> This cause of an extraordinary Plague, as wee confesse and acknowledge, so here we will not prosecute it any further, but thinke fit to leave it to Divines, because it exceeds the bounds of Nature, in which I will now containe my self. Wherefore let us come to the naturall causes of the plague.[25]

Here in a single paragraph Paré stated in naked juxtaposition both that nature was "unchangeable from the beginning" and that God "verily at his pleasure changeth" it, and then hurried on to his real business, which was with its unchangeableness, its functioning as a system.

Most clergymen agreed in the main with this position. However anxious they were to preserve the theoretical possibility that God might occasionally choose to act by miracle, they had to concede that usually he did not. Their complaint, however, was that

[25] *Workes* (1634), Bk. XXII, chap. 2, p. 818.

doctors tended to stress these natural second causes at the expense of the supernatural first cause, and thus substitute nature for God. So Roger Fenton, a preacher, enumerated in *A Perfume against the Noysome Pestilence* (1603) five possible natural sources of plague and cautioned:

> But the judgement of Moses reacheth further, in that he maketh it an effect of Gods wrath: for whatsoever secondarie causes doe concurre hereunto, certaine it is, that the wrath of God is the principall: which being kindled and sent forth, doth fire the rest and set them all a working. He is purblind, as the Apostle speaketh, and cannot see a farre off, who looketh onely upon inferiour causes.[26]

Evidently the difference between the clergy and the medical profession was one of emphasis. The clergy began from God and treated his use of natural causes as an incidental consequence, whereas doctors began from nature and saw God as a distant activator who was somewhat out of their sphere. Henoch Clapham's sermon, *An Epistle upon the Present Pestilence* (1603), displayed typical clerical impatience with this tendency:

> Beloved, God having smitten our Citie with the Pestilence, behold, booke upon booke, prescribing naturall meanes as for naturall maladies, but little said of spirituall meanes, for spirituall maladies, which should give life to the former. To speake and act in such cases, as sole Naturians, is of Christians to become Galenists, and of spirituall to become carnall.[27]

It is easy to see how this difference of stress sometimes led to charges of atheism against the physician.

Despite these disagreements, however, doctors and most preachers made common cause against the still more radical Christian view, entertained by the so-called Stoical or fatalistic Christians,[28]

[26]Sig. A7r.

[27]Sig. A3r. This also is the point of view expressed by such other preachers as James Godskall, *The King's Medicine For This Present Yeere 1604* (1604), sig. E4r, and Henry Holland, *Spirituall Preservatives against the Pestilence* (1593), fols. 15v-16r; Miles Coverdale, *How a Chrysten Man Ought to Flye the Plague* (1537?), sig. A3v.

[28]This title was conferred by Thomas Cogan, *The Haven of Health* (1584), p. 269.

that God smote plague victims directly, without employing any natural process. This view was held, apparently, by sizable segments of the Elizabethan population and by a few clerics of an especially otherworldly turn of mind. It was the fruit of panic and hysteria during the great epidemics, when, for no visible reason, thousands of healthy people seemed to drop dead, while other thousands, no more healthy, survived. What could be the cause except that God in his unsearchable will was striking down his selected victims? The foul sores and buboes of the disease were "God's tokens" or the literal marks of his hand. According to Thomas Nashe's *Christs Teares Over Jerusalem* (1593),

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> Hys hande I may well terme it, for on many that are arrested with the Plague is the print of a hand seene, and in the very moment it first takes them, they feele a sencible blow gyven them, as it were with the hande of some stander by.[29]

If this was the dramatic method by which God killed, it followed that plague was not contagious at all. Each patient had his own private case of the disease, not contracted from other sufferers. Therefore all preventive and therapeutic measures were quite futile. Quarantines imposed by the health authorities need not be observed, sanitation was a wasted effort. The only thing necessary was to trust in the Lord as required by Psalm 91:

> I will say of the Lord, He is my refuge and my fortress: my God, in him will I trust.
> Surely he shall deliver thee from the snare of the fowler, and from the noisome pestilence . . .
> A thousand shall fall at thy side, and ten thousand at thy right hand; but it shall not come nigh thee.

So, by a twist of rationalization, the popular terror of death gave rise to the complete disregard of death. If you looked hard enough at the 91st Psalm you could see that the Lord would not let you

[29]Ed. McKerrow, II, 171-72. Holland, fol. 15r: "Because the Lordes power and might more appeares & is more manifested in this great evill, than in anie other, I thinke it not fabulous what I have heard some reporte, that they have seene as it were the print of a hand upon the armes and other partes of the bodie, of sundrie smitten with the Pestilence."

die, no matter how many others died—others, presumably, who trusted in him less than you did.

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But neither the medical profession nor the great majority of churchmen could allow such a doctrine to flourish. It cast aside the whole science of medicine. Even clergymen who insisted on the primacy of God in the causation of plague realized that age-long experience showed the disease to be catching. Also, it was obvious that a scrapping of all physical precautions by these sectarians jeopardized the life of everybody else. Hence numerous sermons were preached and books written against them during the Elizabethan period, especially in the 1590's and early 1600's when the plague was at its worst. The whole of preacher James Balmford's book, *A Short Dialogue concerning the Plagues Infection* (1603), is a refutation of "that bloudy errour, which denieth the Pestilence to be contagious: maintained, not onely by the rude multitude, but by too many of the better sort" (sig. A2v). Much of John Ewich's *Of the Dutie of a Faithfull Magistrate* (1583) likewise inveighs against them.[30] Theodore Beza's *A Short Treatize of the Plague* was translated into English in 1580 for the same purpose.

Inasmuch as most of the debate was waged on a theological level around the interpretation of Psalm 91, most medical books did not take part in it. The issue, however, is mentioned frequently enough in the medical literature to show that doctors were aware of its dangers. For example, Thomas Cogan's *The Haven of Health* (1584) and John Jones's *A Dial for All Agues* (1566) both denounced the attitude on theological as well as medical grounds, arguing that plague was certainly infectious and that God intended man to use all possible natural means to preserve his life.[31] To fail to use these means was really to commit the sin of suicide. And the question was serious enough to rouse the apprehensions of the Government itself. The official *Orders Thought Meete by Her Majestie to be Executed Throughout the*

[30]Fol. 4r, Epistle Dedicatorie, tr. John Stockwood.

[31]Cogan, pp. 268-71; Jones, sig. G3v; I. W., *A Briefe Treatise of the Plague* (1603), sig. A3r; William Warde's epistle to his translation of *Alessio's Secretes* (1568), fol. 2v.

Counties of this Realme (1588) for the combating of plague contains this order:

Item, if there be any person Ecclesiastical or laye, that shall holde and publishe any opinions (as in some places report is made) that it is a vayne thing to forbeare to resort to the infected, or that it is not charitable to forbid the same, pretending that no person shall dye but at their tyme prefixed, such persons shalbe not onely reprehended, but by order of the Bishop, if they be ecclesiasticall, shalbe forbidden to preache, and being laye, shalbe also enjoyned to forbeare to utter such dangerous opinions upon payne of imprisonment. . . .[32]

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As God was primarily responsible for sending disease, so he cured it or made it fatal, again usually through natural means. The same types of medical books which ignore or play down the former idea do the same to the latter, and in the same ways. Treatises on plague are likely to make brief mention of prayer and moral reformation as the first of all remedies before proceeding to extended discussion of physical therapy. This kind of conjunction is exemplified in William Bullein's *The Government of Health* (1595):

Against the said influences al christian men must pray to God to be their defence, for they be Gods instruments to punish the earth. . . . Then one must make a fire in everie chimney within the house, and burne sweete perfumes to purge this foule aire.[33]

In other types of diseases, it is interesting to notice that the idea of divine healing was usually not invoked except in extraordinarily difficult and dangerous cases. Thus the books of the pious William Clowes, *Observations* and *Struma*, favor the idea chiefly when the patient seems in danger of death. In the easier cases the surgeon might be inclined to feel that he had effected the cure himself.

Miraculous cures worked by God without natural means either

[32]Sig. B2v. This order was reissued without change upon the accession of James I in 1603.

[33]Fol. 30v. Also Fioravanti, p. 21r, and *A Joyfull Jewel* (1579), p. 3 ff.; Benedict Canutus, *A Treatyse ageynst Pestilence* (1510?), sig. A3r; Cary, pp. 45-46.

are not alluded to at all in medical books or, if mentioned, are carefully restricted. In Bullein's *A Dialogue betwene Sorenes and Chyrurgi* (1562) a sick man expresses the wish that nowadays God would perform such miracles of healing as in Biblical times. He is rebuked by Chirurgeon, who explains that "it is rather a tempting of God, then a beleving in God to looke or wishe for miracles, for faithfull men nedes none." Instead, the sick man should use the medicines put on earth for his benefit, "for God hath ordeined theim onelie to helpe his people. . . ."[34] We are familiar with this unremitting pressure by doctors to eject the supernatural from Elizabethan medicine. Nevertheless, an exception with respect to scrofula, the king's evil, was universally acknowledged. Clowes in his *Struma* agreed that when the English or French king touched a scrofulous patient, intoning the words "The King toucheth thee, the Lord make thee whole," a divine power flowed through his fingers capable of healing cases incurable by human art. In his text, however, Clowes said that he could not presume to discuss this supernatural gift, and confined himself instead to "the true path-way of Artificial gifts, (which God of his great goodnes giveth to men of Arte)."[35] Whether from motives of humility, indifference, or disdain, medical men of letters certainly inclined strongly to do the same.

Exorcisms, charms, amulets, incantations, and the like were also condemned as futile and superstitious. Any physician using them was ridiculed by his colleagues as a quack.[36] Indeed as one

[34]Fol. 9r, bound in with Bullein, *Bulwarke* (1562). Juan Huarte, *Examination of Wits*, pp. 15-19, made the same point very emphatically. Cf. Bullein, *Regiment against Pleurisi*, sig. B1 v.

[35]P. 68 and sig. A2v. See also Securis, sig. B5r.

[36]See esp. John Hall, *An Historicall Expostulation against the Beastlye Abusers, Both of Chyrurgerie and Physyke*, appended to his translation of Lanfranc; and the vigorous contempt of Clowes, *A Prooved Practise for All Young Chirurgians*, sig. A3r. John Oberndoerffer, *The Anatomyes of the True Physition* (1602), p. 16, attacked the impostors who "... that they may colourably and cunningly hide their grosse Ignorance, when they know not the Cause of Disease, referre it unto Charmes, Witchcrafts, Magnificall Incantations, and Sorcerie, vainely, and with a brazen forehead, affirming that there is no way to help them, but by Characters, Circles, Figure-castings, Exorcisme, Conjurations, and other Impious, and Godlesse Meanes." Cotta, p. 49 ff.

of the chief devices favored by renegade doctors and "empirickes" in cheating the ignorant public they were a principal target for the scorn and indignation of the reputable practitioner. Both the College of Physicians and the Barber-Surgeons' Company made constant, if unavailing, efforts to stamp out this practice, efforts which are fully reported in their records.[37]

IV

Upon review of the whole situation we can now distinguish four main types of attitude toward the role of God in disease. A small group of medical atheists held that disease came by natural processes only. Most doctors, however, accepted the addition that these processes were set in motion by God. Most clergymen, shifting the emphasis, spoke of God as the originator of disease though normally using natural means. At the extreme, a minority group of Stoical Christians preached that God struck the individual victim directly without using natural means. Between the first and the last groups there was obviously no common ground. The atheists were materialists, the Stoical Christians spiritualists. But the two moderate parties shared a common acceptance of both sides of the Elizabethan dualism, body and spirit. And since these parties represented the great majority of Elizabethans there was no sharp split between the dominant views of the relations between medicine and religion during this period.

Both parties wished to preserve the idea that God was an active power in man's affairs, as well as the idea that a normally inviolable order of nature existed. The former may be regarded as primarily a religious need of the human heart, the latter as a necessary basis of all science. But it would be misleading to think of the clergy as interested only in the one, and the medical profession only in the other. Doctors were human beings who felt their own religious needs and inclined to accept the solutions current in the society in which they had been educated. And the priesthood

[37]Charles Goodall, *The Royal College of Physicians of London* (1684), and Sidney Young, *The Annals of the Barber-Surgeons of London* (1890).

was too pragmatic to blink the fact that the world seemed to run a natural course or to ignore the very considerable corpus of systematic information which had been gathered about it. Indeed, many clergymen, especially in the country districts, practiced medicine on the side;[38] many doctors had studied theology at one time or another.

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If Elizabethan religion had consistently taught that, since its creation, the universe operated solely according to a system of natural law never broken by God, much of its ground of conflict with medical science would have disappeared. But we have already seen in Chapter 5 that the Elizabethan concept of God was much too personal to permit any such concession. Christianity visualized God as wielding the world's natural forces to punish or reward the behavior of mankind on a moral basis. One therefore gets the impression from reading both sermons and medical books that the natural order was considered quite responsive to man's fluctuations of good and evil conduct. Doctors and preachers had in mind a picture of God beginning numerous short-term chains of causation designed to achieve particular afflictions and cures, instead of persisting in a single long-term chain of causation capable of producing them all.

This, as I say, was implicit in statements of the general popular view of the matter. They did not trouble themselves to explain how God fitted all his different responses to human vice and virtue into a physical pattern of nature, nor what happened to the pattern when God chose to act directly by miracle. Theologians in the library might labor to show that God's scheme at the beginning of creation was ample enough to foresee and contain

[38]Cotta, pp. 86-89, loudly complained that too many clergymen were dabbling in medicine, "making themselves roome in others affaires, under pretence of love and mercie." In the preface to his *Phlebotomy* (1601), sig. A6v-7r, Simon Harward, a minister, defended his writing a book on medicine: "...the conjunction betwixt the body and soule being so neere, and the sympathy so great, I see no cause but that he which studieth Divinity, may lawfully now and then so bestow a spare houre in viewing of the remedyes ordayned of God for mans infirmities, that he may be able in corporall extremities to yeeld reliefe as well particularly to himselfe, as in common to his good friends." Also Gyer, sig. A7r.

all these separate chains of natural causation, miracles, and choices of human free will in one tremendous order. But as soon as they passed out of the library and became teachers of men they were bound to talk as if God's anger, mercy, or reward were spontaneous reactions to the behavior of their parishioners. Why lead a good life in order to escape the plague, for instance, if it had been settled, or even foreknown, ages ago that through the design of nature you were going to catch it anyway? So popular religion had to hold fast to the idea of the flexibility of God's manipulation of natural law according to the variations in human morality.

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But this same flexibility so necessary to religion was a principle of uncertainty most unwelcome to medical science. The doctor had a difficult enough task in trying to understand the normal workings of disease without having to consider abnormal appearances and sudden mutations arising from moral factors outside his ken. The result seems to have been that in practice he simply did not consider them. He might admit that disease was a punishment for sin or a trial of virtue, but he nevertheless went ahead telling people how to avoid disease and how to get rid of it after it had been contracted. In this program he was protected by another theological doctrine, that God requires man to take all available natural measures of self-preservation. But on the theoretical plane it certainly demanded a nice nimbleness of thought to explain why God should exhort men to try all means to avoid the very illness which God himself was sending on purpose as a divine infliction.

In order to solve this dilemma some theologians, followed by some medical men, made an ingenious distinction between plagues sent by wholly supernatural means as exhibitions of heavenly wrath and plagues which, though initially motivated from God, arrived through exclusively natural phenomena and were not instruments of moral instruction.[39] The former could not be treated by medicines; the latter could. Obviously, doctors in gen-

[39]Ewich, *The Dutie of a Magistrate*, fol. 3r & v of the Author's Preface; Cary, p. 46; Vicary, p. 346; Paré, loc. cit.; Valentinus, p. 60.

eral could make nothing of these refinements. All plagues looked alike to them, killed victims in the same ways, and called for the same effort of prevention and therapy. A doctor could not stop to ask his patient whether he was dying of a supernatural plague or a natural one. Of course, after the man was dead it might be useful to conclude that the plague had been supernatural.

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Physicians got into similar difficulties with the belief, validated by the text from Job 14:5, and affirmed by theologians, that each man's death hour had been set by God before the man had ever been born. Here was a fixed event. So in every case of serious illness for the individual or epidemic for the community the argument quite logically arose that it was useless to apply medicines because if the destined death hour had arrived the patient would die anyway, and if it had not, he would not. This was in fact the argument accepted by the Stoical Christians which gave rise to so fatalistic an attitude in large portions of the population during severe epidemics and seriously hindered the work of quarantine. In strict logic there was no good answer to this surrender of action once the premise was accepted that the hour of death had been predetermined.

It would have been much easier to let the premise go, but the clergy set out to save it and at the same time to champion the health regulations by various interesting evasions. One was to harp on the familiar idea that God had put medicines on the earth for man's use and had enjoined him to use every possible natural measure to prolong his life. In support of this view, numerous Biblical figures like Abraham, David, Jacob, and Elias could be cited[40] who had certainly made every effort to save their own lives without worrying about metaphysical considerations as to whether God had predetermined that they should live or die. Most ingenious, however, was the device of some preachers who declared that, although a man could never postpone the date set for his natural death, he might definitely hasten it by neglecting at any time to use natural means, including medicines, for his own

[40]E.g. Jones, sig. G4v; Bullein, *Dialogue*, fol. 41r.

preservation.[41] The effect of this was really to unfix the fixed event of death and to restore the incentive to use remedies, since these might at least change the present outcome. No one could tell in advance whether a given sickness was or was not destined to lead to the natural death hour.

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Doctrinal gymnastics of this kind were fascinating devices to save side by side both the sense that human life was under the hand of the Almighty and the sense that it was in man's own keeping. But the doctor could not pay them much heed. He might believe that the life span of every individual was foreordained, but as a practical man he had to assume when he approached the bedside that he could perhaps save the sick man's life. Clearly the doctrine was sharply hostile to medical science. It was given some verbal notice in medical treatises, but their whole dynamic was to push towards a cure in even the apparently most hopeless cases.

Because we have spoken of some instances in which the theology of medicine did not affect actual practice, the question may be asked whether it ever had practical consequences in any degree. In some of the more obvious ways, it did not. Doctors do not seem to have relied habitually on prayer and moral counsel in treating the sick. Their books occasionally gave a form of prayer to be said before or after a perilous operation, but when narrating case histories they did not describe the physician as praying or probing into his patient's moral soundness.[42] Nor would the average doctor have been quick to discover supernatural manifestations in any case he was treating, certainly not witchcraft or demonic possession. With regard to God's intervention, he would probably hide

[41]Boorde, *The Breviary of Healthe,* fol. vir, Cf. Coverdale, sig. C4v.

[42]This was true, for example, of the numerous case histories told by William Clowes and Peter Lowe. The charter of St. Bartholomew's hospital in London as set forth in *The Ordre of S. Bartholomewes* (1553), sig. E4r, directed surgeons: "Also at all such tymes as ye shall go to the dressyng of any diseased persone in this house, asmuche as in you is, ye shall geve unto hym or her, faithfull and good counsaill, willing them to mynde to sinne no more, and to be thankefull unto almighty GOD, for whose sake they are here comforted of men." But the charters of public charitable institutions are notoriously more pietistic than the surrounding society.

behind the doctrine that the Lord acts almost always by natural means, leaving the burden of proof as to possible rare exceptions upon the theologian.

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On the other hand, his inherent piety had, no doubt, less definable effects on his professional conduct. His sense of the presence of a watchful God was good for his standard of ethics. The idea of the religious derivations of medicine gave him a satisfaction in the honorableness of his calling and a feeling of unison with God's purposes in the work of healing. The same idea encouraged new medical discovery and research, on the theory that the Creator intended man to know all the wonder of the human body and all the hidden virtues of drugs. It is hard to say to what extent the physician's belief in God's ultimate control over disease may have discouraged him from putting forth his most strenuous efforts to prevent or cure it. Probably in some temperaments it did promote a disposition to give up a little sooner. In others, since God was thought to work through the physician, it might have had the opposite effect. But in critical cases, when the doctor had done all he could and the issue was still in doubt, the tendency must have been to feel that the outcome was now in the hands of God. And among the sometimes uncontrollable decimations of the plague, the idea that God was punishing a wicked people must often have passed from a textbook platitude into a dreadful conviction. The Elizabethan doctor's religion lay close under the surface of his science, ready to break out whenever the circumstances were so extraordinary or so terrible as to fall beyond the bounds of his knowledge and summon thoughts of a divine agency.

Dangerous tensions did persist between medicine and religion, but they were not of the kind to deprive the medical man of either a congenial intellectual climate or virtual freedom of action in which to carry forward his work. Many of them were tensions between the doctor's need for an idea of regularity in nature as a basis for science and the religious need for an idea of irregularity as expressive of transcendent manipulation by God. Since almost everybody conceded, however, that God very seldom injected any such irregularity by direct, miraculous action the physician

could in his practice ignore the few theoretically possible exceptions. And that other normal and regular action of God through nature to impose moral sanctions on mankind did not bother him either, because it could not change his diagnosis and treatment of actual cases of disease. In this atmosphere Renaissance medicine flourished, producing its Vesalius, its Paré, its Harvey, and many others. If anything, the real damage flowed the other way, from medicine to religion, through the materialistic and deterministic tendencies within medicine itself, and through the manner in which these were sometimes adopted into Elizabethan psychology.

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14

Body and Soul

I

WHEN re-editing, with a rather myopic Protestant eye, the Catholic work, *The First Booke of Christian Exercise* (1585), Edmund Bunny found its doctrine of the passions too deterministic. So he added a long marginal note to explain that "the soul doth not folow, but rather doth uze such temperature as the bodie hath."[1] A man's complexion or bodily constitution, Bunny admitted, may indeed render him particularly prone to certain types of emotional bias, but these are "neither good, nor il of themselves" and can be controlled by his will for righteousness. The contrary view leads to doubt about the immortality of the soul, for if the soul depends on the temperature of the body, and this temperature itself dies with the body, must not the soul die too? In the 1598 edition of the same book Robert Parsons, its original author, retorted angrily (and quite accurately) that neither he nor Catholics in general meant any such thing.[2] They were as anxious as any Protestant to guard the human will against a doctrine of physical determinism. For us this bit of unpleasantness has at least the value of showing how abhorrent to clergymen of both faiths was the tenet that the manners and choices of an individual's soul are automatic results of the proportions in which the humors are mingled in his body—in other words, of his complexion.[3]

[1]P. 171.

[2]Fol. 11v.

[3]Good summaries of the familiar Renaissance doctrine of complexion may be found in Ruth L. Anderson, *Elizabethan Psychology and Shakespeare's Plays*, Univ. of Iowa Humanistic Studies, III, no. 4 (1927); Lily B. Campbell, *Shake-*

This tenet was in truth hostile to the whole Christian concept of man as a spiritual being. The soul was carefully defined, we remember, as a separate, spiritual, immortal substance for which the body is merely vehicle.[4] With its faculties of reason and will, soul is placed in the flesh to rule it, not to be ruled by it. Unless by the autonomy of his will the choleric man can curb his temptations of anger, the melancholy man his despair, virtue and vice are meaningless, and all ideas of Christian warfare against the world, the flesh, and the devil merely a dream. Even the most rigorous Calvinists fought hard for the principle that the will is free in this sense.[5] What they maintained, not without paradox, was that the will thus freely choosing would choose evil because of original sin unless God gave it grace; and that certain men were predestined to receive this grace, others not. But this is a very different matter from denying the free function, if not the very existence, of the will on the ground that the humors decided everything.

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Glancing back to Chapter 10 on judicial astrology, we can now recognize the united clerical attack on that science as one campaign in this larger war against materialism. The line which divines tried to hold at all cost was that the stars may incline a man's will in this or that direction, but never compel it. Stars act upon humors; humors beget passions; passions solicit will; but the last word lies with will. Hence there can be no genuine science of astrological prediction. Similarly in the broader controversy with medical materialism divines always took the position that body may predispose but never decide the character of man. And

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speare's Tragic Heroes (Cambridge, 1930); Timothy Bright, *A Treatise of Melancholie* (1586), pp. 4 ff.; Peter Lowe, *The Whole Course of Chirurgerie* (1597), sig. C1 v. The doctrine performed for Elizabethans the extraordinary double duty of explaining both the likenesses and unlikenesses between men and the differences between health and sickness in the same man. For a description of the physiological process by which the predominant humor influenced passion see Thomas Wright, *The Passions of the Minde* (1604), pp. 37, 47; La Primaudaye, *Second Part of the French Academie* (1605), pp. 230-31.

[4]See chap. 11 ante.

[5]E.g., Perkins, *Gods Free Grace, and Mans Free Will* in *Works* (1605).

their conclusion, analogously, was that the medical sciences have no business meddling with man's higher nature. But the wide divergence between the astrologer and the physician in this respect was that the former needed a physical determinism as the first principle of his science, whereas the doctor did not. The latter could and did retire into the exclusive study of the human body, with only the most diffident excursions into the region of the mind. One result of this necessary but jealous guardianship of the soul by all Christian churchmen may well have been to discourage systematic study of the interrelationships of body and soul, or what we know today as psychology. It will also appear in a moment that for methodological reasons the medical man was on the whole content with this cleavage of jurisdictions, and in fact encouraged it wherever advantageous to the purity of his science.

The temptations of the Elizabethan physician towards materialistic determinism may readily be illustrated from the medical books of the time. Nothing is more common in them than those familiar lists of the traits to be found in men of each of the four humoral types, a jumble of characteristics ranging from color and texture of hair, eyes, and skin to intelligence and stupidity, virtue and vice. Peter Lowe's conglomeration in *The Whole Course of Chirurgerie* (1597) is representative:

> He of the sanguine complexion is fleshie, liberall, loving, amiable, gratious, merrie, ingenious, audacious, given to Venus game, red coloured, with divers other qualities which sheweth the domination of the blood.... The cholericke is hastie, prompt, & in all his affaires envious, covetous subtill, hardy, angrie, valiant, prodigall, leane, yellow coloured, and is hot and drie, & is in good health in winter. The *Flegmaticke* is fat, soft, white, sleepie, slothfull, dull of understanding, heavie, much spitting, & white coloured.... The *Melancholicke*, which is eyther by nature or accident of colour livide and plumbin, and solitarie, coward, timide, sad, envious, curious, avaritious, leane, weake, tardife, and so foorth....[6]

[6]Sig. C3r. Also Levinus Lemnius, *The Touchstone of Complexions*, tr. T. Newton (1581), fols. 38v, 64v, 84r; Valentinus, *Enchiridion Medicum* (1612), pp. 15-26 and 5 ff.

Language of this kind sounds distinctly deterministic. Lowe says not that a man of the choleric type tends to be covetous, or is tempted by covetousness, but that he *is* covetous. A moral result is stated as if springing automatically from a physical condition without any intervening act of choice by the will. Similarly when Thomas Walkington in *The Optick Glasse of Humors* (1607) says of sanguine men that "they bee liberally minded; they carry a constant loving affection . . . they are very hairy,"[7] the love and liberality seem to be about as voluntary as the hairiness. The same tone carries over into the Elizabethan view, a familiar extension of the doctrine of complexion, that national temperaments are the result of geographical environment acting upon the humors of the people. Lowe, for example, can say that "the people towards the South are mealancholick, cruel, vindicatyf, always timide."[8] Others describe northerners as dull-witted, alcoholic, and so forth because the cold and moist climate increases phlegm. Not all statements of this kind are so unconditional, but as a genre they leave the strong impression that there is no such reality as the human will.

The reasons for this categorical and deterministic tone lie close at hand. Under a Galenic theory in which disease is an upset of the patient's normal balance of humors, the doctor must discover both what that balance used to be and what has since happened to it. As far as he is concerned, the mental traits connected with complexion are interesting not for their own sakes but solely as useful evidence of what has been going on inside the sick man's body. The connection therefore must be rigid, unqualified, and automatic if these traits are to be of any real use to him as symptoms or causes of disease. Hence his temptation to look at human behavior from a strongly deterministic point of view. The dynamics of his science seemed to require it. But this was a direction, a pressure, not an overt policy. So far as I can tell, no published

[7]Fol. 59v. Also Burton, *The Anatomy of Melancholy* (1621), ed. A. R. Shilleto, (1896), I, 485-86.

[8]Sig. C2r; Walkington, fol. 15r; Ambroise Paré, *Workes*, tr. T. Johnson (1634), pp. 19-20.

Elizabethan medical book ever claimed outright that the manners of the soul inevitably and completely follow the temperature of body.

II

Science and Religion in Elizabethan England

Elizabethan psychology was a wild medley of these medical and religious attitudes. Well might it be. Professional psychologists as a class being yet unborn, the authors of most works on psychology were either doctors or clergymen. The following table of twelve major publications before 1641 in England, either original or translated, gives some idea of the situation:

AUTHOR	OCCUPATION	TITLE
Timothy Bright	M.D., later in holy orders	*Treatise of Melancholy* (1586)
Robert Burton	Clergyman	*Anatomy of Melancholy* (1621)
F. N. Coeffeteau	Catholic Bishop of Dardania	*Table of Humane Passions* (1621)
Sir John Davies	Lawyer and statesman	*Nosce Teipsum* (1599)
Jacques Ferrand	French physician	*Erotomania* (1640)
Juan Huarte	Spanish physician	*Examination of Wits* (1594)
Peter de la Primaudaye	French courtier	*French Academie, Pt. II* (1605)
Andreas Laurentius	Physician to Henri IV	*Preservation of the Sight* (an analysis of melancholia) (1599)
Levinus Lemnius	(Dutch?) physician and divine	*Touchstone of Complexions* (1581)
Edward Reynoldes	Bishop of Norwich	*Treatise of the Passions and Faculties* (1640)
Thomas Walkington	Clergyman	*Optick Glasse of Humors* (1607)
Thomas Wright	Jesuit (?)[9]	*Passions of the Minde* (1604)

Except for two lay outsiders, doctors and divines made up this group in about equal numbers. The doctors of course started with a medical bias. The clergy were more likely to set out to find

[9]Burton, I, 290 and 483, refers to "Wright the Jesuit in his Book of the Passions of the Mind," but the *DNB* denies the identification.

ethical and religious meanings in their subject. But since passion was the chief instigator of the will to vice and subsequent damnation, and since passion in turn was largely the immediate product of complexion, divines writing on psychology were led deeply into physiology and a consideration of body's impact on soul. Hence the dual tenor, physical and ethical, of many of these Elizabethan treatises, often juxtaposed in radical, unresolved conflict. Like Polonius, one might distinguish many types among them, such as the physical-psychological, the psychological-ethical, the physical-psychological-ethical-theological, and so forth. But a brief look at some of the individual books is worth a world of classifications.

Body and Soul

One of the best balanced of all these writers is La Primaudaye, whose *Second Part of the French Academie* (1605) is a kind of Renaissance *Summa Psychologica*. It assembles and gives full value to all elements bearing upon the relationship between passion and will: the concupiscent body whence passions are born; the rectification to be sought in custom, education, and religious counsel, which help the will to grow into a good habit; the power of God; and of course, fully discussed, the immediate protagonists, passion and will themselves.[10] Affirming the will's power over complexion and its minions, the passions, and calling for its direction towards virtue and salvation, La Primaudaye—Wright and Coeffeteau resemble him in this[11]—refuses determinism, eschews undue emphasis on body, and looks at psychology from a prevailingly ethical and religious point of view.

With Reynoldes' *A Treatise of the Passions* we begin to shade over into works which put more stress on the contributions of body to psychology. Where his emphasis falls may be gauged from his statement that the rational soul

> . . . depends in all its ordinarie and natural operations, upon the happie or disordered temperature of those vitall Qualities, out of whose apt and regular commixion the good estate of the Body is framed and composed. For though these Ministeriall partes have not any over-

[10]P. 382 gives a characteristic summary.

[11]Wright, esp. Books II and III; Coeffeteau, sig. A7r.

ruling, yet they have a disturbing power, to hurt and hinder the operations of the Soule: Whence wee finde, that sundry diseases of the Body doe oftentimes weaken, yea, sometimes quite extirpate the deepest impression and most fixed habits of the minde. . . .[12]

Science and Religion in Elizabethan England

There is all the difference in the world between saying, as Reynoldes seems to say, that "body controls unless—" and saying, as La Primaudaye does, that "will controls unless—." The same leaning is implicit in the heading of Reynoldes' second chapter: "In what Cases the dependance of the Soule on the Body, is lessened by Faith, Custome, Education, Occasion."

In *The Touchstone of Complexions* by Lemnius this trend towards body is much more marked, though it is not easy to sift anything definite out of this loose and chaotic piece. Most of the book goes to an analysis of the physiology of the four humors and their psychic consequences. Granted, Lemnius says in a few isolated passages, that reason can resist such emotions by the aid of God and that education and good counsel are of some use,[13] but the language used to describe how bodily qualities make men what they are is so unqualified, his obsession with the onrush of passion so frequent and strong, that we come away thinking most men to be what their bodies dictate.[14] Lemnius virtually dispossesses the will as an active force.

The same description applies to Walkington's *The Optick Glasse of Humors*, which assumes that moral result follows more or less inexorably from humoral condition.[15] Thus it shares the medical man's point of view, not the moralist's, and it is perhaps significant in this regard that the authors chiefly cited are Lemnius, Fernelius, Cogan, and other physicians.

Huarte's *Examination of Wits* amounts to an early book of vocational guidance, but on a very strange theory. Beginning from

[12]P. 4.

[13]E.g. fols. 13v-14v, 60v.

[14]Fols. 25r ff., 64r ff., 128r.

[15]Fol. 9v. The heading of Cap. 2 is the Galenic theorem, "That the soule simpathizeth with the body and followeth her crasis and temperature." Also fols. 10r, 15r, 31r, and 55v ff.

a belief that all knowledge is complete in a child's soul at birth but that it can reveal itself only in so far as the temperature of body is favorable,[16] Huarte comes to the bizarre conclusion that the only requisite in education is a physical regimen proper to development of the right bodily temperatures. All souls are inherently equally endowed with knowledge, but selective mating of parents and variations in their offspring's diet as he grows up will serve to provide constitutional temperatures which make available parts of this intellectual endowment suitable for this or that profession in life. Huarte's entire interest, therefore, is in body as the soul's instrument. Soul, being already perfect in knowledge, is beyond his attention except that he takes care to assert, as did Bright, Laurentius, Lemnius, and other advocates of the medical view before him, that soul in its essence can never be tainted by an adverse temperature of body. The net result is a book more divorced from genuine moral and religious considerations and more totally ridden by the idea of body than most other Elizabethan works on psychology and than not a few professedly medical treatises.

The five foregoing treatises run the gamut of Elizabethan psychology. None of the writers believed, presumably, that body really completely determines will. Some denied it in so many words. But their incorporation of the language and emphases of medical science sometimes made them sound like deterministes in spite of themselves. Even divines writing on psychology might stumble into such contradiction. Nevertheless as clergymen they could make no conscious compromise with the principle that the manners of soul, though biased by the temperature of body, did not necessarily succumb to it.

III

On the contrary, the Christian position was that the current flowed the other way. Temperature of body was in some large but unspecifiable degree determined by the manners of soul, that

[16]Pp. 32 ff.

is, by the success or failure of the individual's will in asserting itself over his passions and by the internal order or disorder which then prevailed. In this contention the Church had, to an extent we must now explore, some support from Galenic medicine.

Science and Religion in Elizabethan England

Many medical and psychological books described how the process worked.[17] When an emotion of the soul was aroused by some experience from the outer world of sense or by some suggestion of memory from within, the heart's vital heat was thereby augmented or diminished, depending on the happy or threatening nature of the stimulus. By this cardiac dilation or contraction, the manufacture of arterial spirits and their distribution throughout the body were changed for better or worse, and the purity and proportion of humors underwent mutation. If emotion of the same kind was repeated often enough, it altered the whole bent of the physical constitution. It might make the body ill. "These mocions of the spirit," observed the physician William Bullein in his *Bulwarke of Defence* (1562),

> . . . must be as well considered, and diligently observed of the Phisicion, in the tyme of sicknesse, as moche as any other common knowen sicknesse. For these perturbacions or painfull affeccions of the spirites, do chaunge the estate of the bodie, marveilously and sodainly.[18]

From the standpoint of the Christian teacher the will must intervene to discipline such emotions before any harm set in to body or mind. Peace must bring health. And the physician, too, could not blink the need for a better mental attitude in any patient thus afflicted. But since he felt concerned with the physical, not the ethical and volitional, side of the problem, he could not afford to be drawn off very far into psychic or spiritual considerations. Emotion was only one factor in the case. He had others to weigh.

His master Galen had reduced under six heads—six so-called

[17]Coeffeteau, p. 2: "That which is called passion, say they, is no other thing, but a motion of the sensitive appetite, caused by the apprehension or imagination of good or evill, the which is followed with a change or alteration in the body, contrary to the Lawes of Nature." Wright, pp. 32, 45; Valentinus, pp. 22-23; Lowe, sig. F4r & v; Sir Thomas Elyot, *The Castell of Helth* (1572), fols. 64v ff.

[18]Sig. Lxxiir.

"non-natural things"[19]—the factors which mold, alter, or confirm the complexion at any time between birth and old age. Sir Thomas Elyot, *The Castell of Helth* (1572), named them in their usual order: "Ayre, Meates & drinke, Slepe & watche, Meving and rest, Emptines and repletion, and Affections of the mynde."[20] All these determined the proportions of heat, cold, dryness, and moisture in the body, and so its complexion. The same tally, in this same order, was repeated by almost every Elizabethan work on medicine or psychology. Tagging along always so inconspicuously at the end, the final item, the "affections of the mynde," has for us a quiet but vast significance. It was Elizabethan medical recognition that states of soul are inevitably reflected in the matter which soul inhabits.

But this recognition seems in most cases to have been a merely verbal and perfunctory one. The great majority of medical books in the period contented themselves with a bare mention of the passions as causes of complexion and gave virtually their whole attention to the other five items: air, food, sleep, exercise, and evacuation. For example, Phayre's *A Godly Brief Treatise of the Pestilence* (1596), discussing the six non-natural things whose abuse produces corrupt humors, allotted exactly two sentences to the passions of the mind.[21] Recipes for drinks, pomanders, and powders followed at far greater length. In all its 790 folio pages

[19]Called "non-natural" in order to distinguish them from the seven "natural" factors: elements, complexions, humors, members, powers, operations, spirits. Cf. Christopher Wirtzung, *The General Practise of Physicke*, tr. J. Monson (1605), To the Reader; Paré, p. 39. Other, more remote factors bearing upon complexion, such as heredity, the stars, and ultimately God's Providence, were given by various medical writers sometimes a good deal of stress, sometimes less, sometimes none at all.

[20]Fol. 1r. Also Valentinus, p. 15: "There are six things necessary to the nourishment and preservation of mans life, and are called not naturall. 1 The Aire. 2 Meate and Drinke. 3 Sleepe and watchfulnesse. 4 Exercise and rest. 5 Emptiness and repletion. 6 The affects of the minde."

[21]Sig. M4v. See also Gratarolus, *Directions for Health* (1574), which of a total of 150 pages discussing the six non-natural means for preserving health gives three pages to "affections of the mind"; and Walter Cary, *Farewell to Physicke* (1583). Thomas Newton, *The Old Mans Dietarie* (1586) allows a fair proportional representation to the passions. Thomas Cogan, *The Haven of Health* (1584) leaves them out entirely.

The General Practise of Physicke (1605), by Christopher Wirtzung, noticed the soul only twice: once briefly in the introduction, where peace of soul was listed as conducive to good health, and again in the chapter on melancholia, where fear and sadness were described as mental accompaniments of the disease. But Wirtzung in this latter chapter laid all his emphasis on diet and other physical factors as real causes of melancholia: "The cause of these melancholicke fantasies do proceede most from the nature of the meates which ingender melancholicke bloud; to wit, all Venison, but especially Hares. . . ." Consequently, the therapy must also be physical, such as the eating of "young Mutton, Kids. . . ."[22] Bathing and the hearing of music are likewise good. This last, however, was but a gracious afterthought cramped in among prescriptions for phlebotomy, syrups, purgations, and vomits. It is not that Wirtzung, a sensible man, was blind to the psychic influences in melancholia, but that he did not feel it any duty of his to treat that aspect of the disease. Hence a sharp separation of body from soul for purposes of methodology.

The best Elizabethan text on anatomy, John Banister's admirable *The Historie of Man* (1578), opened its chapter on the brain with the single statement that it is the "seate of the principall part of lyfe, by whose benefite we imagine, reason, and commit to memory," then proceeded to show its structure in detail without reference to its functions as an organ of the soul or any apportionment of the several "ventricles" to their appropriate faculties.[23] Indeed, Banister's use of the word "lyfe" rather than "soul" indicates how completely he left the whole religious aura out of the discussion. Likewise Nicholas Gyer, *The English Phlebotomy* (1592), described in Galen's highly sterilized fashion the three life powers, "the animall vertue . . . diffused from the braine, by the sinewes: The vitall force from the hart, by the arteries: The naturall

[22]Pp. 117-61, esp. p. 131. See similarly Philip Barrough, *The Method of Phisicke* (1601).

[23]Fol. 98r. Wirtzung, p. 117, follows him in this, but Thomas Vicary, *The Englishmans Treasure* (1586), p. 17, fully discusses the inner senses of the sensitive soul, though not the passions or the rational soul, in connection with the brain structure.

strength from the Liver by the veines,"[24] without tracing them back to the animal, sensitive, and vegetal virtues of the soul, or any of its spiritual activities. Gyer was a clergyman, but he chose to follow here his classical, Arabian, and recent continental medical authorities who isolated body almost entirely from "soul," as distinguished from "life." So imperious was the medical tradition even to divines working in it.

Body and Soul

The dominant tendency among Elizabethan doctors, then, was to minimize the soul in professional discussion, if not to exclude it altogether. Their reasons were largely methodological. Physicians had much more control and understanding of tangible diet, sleep, exercise, and so on, than of intangible perturbation, will, and reason. The latter were intrusions into the otherwise orderly, comprehensible system of the human body. Better to leave them alone.

A few more rash or, if you prefer, more advanced spirits took a different view, however. Sir Thomas Elyot in *The Castell of Helth* (1572) rated affections of the soul at least as important as air, food, sleep, and the other "non-natural" things. A special feature of his approach was that under each passion, after picturing its consequences to body and to the moral status of the soul, he offered both moral advice and medical prescription. These Elyot regarded as inseparable:

> The last of thinges called not naturall, is not the least parte to bee considered, the whiche is of affectes and passions of the minde. For if they be immoderate, they do not only annoy the body and shorten the life, but also they do appaire, and somtime loose utterlye a mans estimation. And that much more is, they bringe a man from the use of reason, and sometime in the displeasure of Almighty God. Wherfore they do not only requyre the helpe of phisicke corporall, but also the counsaile of a man wise & wel learned in moral Philosophy. Wherefore after that I have recited, what they be, I will briefelye declare suche counsayles as I have gathered.[25]

[24]P. 131. *Phlebotomy* (1601) by Simon Harward, likewise a divine, imitated the same method.

[25]Fol. 64r & v.

The moral consolation then set forth accents the need for Christian humility and forgiveness and refers often to the example of Jesus. Thus Elyot felt obliged to act as both divine and physician where most other Elizabethans were content to leave each field to a specialist.

Science and Religion in Elizabethan England

William Bullein's *The Booke of the Use of Sicke Men and Medicines* (1562)[26] is in the same category. Perhaps the classic example of how far this tendency may go, however, is John Jones's *The Art and Science of Preserving Body and Soul in Health* (1579). This very heterogeneous book traced the steps by which the parents and nurse of a growing child can give him simultaneously a healthy body, good morals, and the theological virtues of faith, hope, and charity. Physical health, said Jones, allows the soul to govern by reason its illicit passions, whereas a sickly body makes for ungovernable passions and hence for vice. Health engenders virtue; virtue engenders health. Later chapters went over into a theological handbook outlining Protestant tenets of original sin and grace, besides discussing ethical theory. Indeed the author, able to set no narrow bounds to measures necessary for health of soul, branched out largely into exhortations on politics and the state of England generally. Medicine was almost, but not quite, squeezed out of the book by these alien elements. But to call them alien perhaps betrays our modern bent towards specialization, which bothered Jones, Elyot, and Bullein not at all.

Nevertheless their own books make the perils of their method stand out vividly. For these works are not clear expositions of medical science interrelated with clear expositions of mental science. They are badly jumbled expositions of both and successes in neither. The result, perhaps, is to confuse medicine and not to help ethics and religion. Only Elyot managed to handle the two subtly merging disciplines together with some measure of intelligibility. Yet the opposite choice—that of keeping medicine quite bare of all spiritual connections—had its own serious vices. Human habit is insidious. Perpetual dealing with body as if there were no soul too often precedes the conclusion that indeed there is

[26]Printed with Bullein's *Bulwarke of Defence.*

none. The medical man in his desire to keep his subject within limits of verification may, if he is not constantly reminded, go down the road to materialism. And that a number did so is the unimpeachable testimony of the age. For methodology may beget philosophical system; materialism can be a rationalization of scientific method, attempted not only by the physician himself but also by thinkers who become imbued with his manner of attack. That Elizabethan psychology lay partly under this shadow has already been made clear.

Body and Soul

From the churchman's point of view the problem of soul in medicine was much like the problems of Satan and God in medicine noticed in Chapters 6 and 13 respectively. God, Satan, and the soul were of the order of spirit, whose active preeminence in the order of matter must never be forgotten. In particular, God as the ultimate source of all health and disease must not be thrust out of the medical situation by neglect, omission, or underemphasis by either doctor or patient. Otherwise first his power and then finally his very existence might come to be denied. Less serious, though still keen in its parallel implications, seemed the going of Satan, God's agent, into medical exile. But to forget the soul as a force upon the body was as disastrous as to forget God himself. For methodological oblivion of the one would obliterate the other also.

IV

The manners of soul do not follow the temperature of body, but the temperature of body is affected, through the passions, by the manners of soul. We have just been seeing how these two basic Christian concepts fared at the hands of Elizabethan doctors and psychologists in ordinary cases of health and disease. Rather special issues arose, however, in cases of mental disease like mania and melancholia.[27] There the patient's reason and will might some-

[27]Authoritative treatments of Elizabethan views on melancholia are Sanford V. Larkey's introduction to his facsimile ed. of Laurentius, *The Preservation of the Sight* (Oxford, 1938); Laurence Babb, *The Elizabethan Malady* (Lansing, Mich., 1951); Erwin Panofsky's interpretation of Dürer's 'Melancholia I' in *Albrecht Durer* (Princeton University, 1943), I, 156-71.

times be entirely submerged; causeless feelings of guilt falsely resembling the remorse of conscience might torment him; and his religious faith itself be shaken by delusions. Definition of the relative shares of body and soul in such mental illness posed for Elizabethan psychologists problems of the gravest difficulty, which have scarcely been solved even today.

Science and Religion in Elizabethan England

Their first step always was to save the Christian premise that the soul was a separate spiritual substance. Being incorporeal, soul cannot be sick in the same sense that the body is. No physical or mental disease can touch its immortal and impatible essence. The alternative would be materialism, and a good many writers such as Bright, Laurentius, and Burton say so emphatically. In the words of Laurentius:

> And yet I would not have thee (O thou Atheist whosoever thou art) hereupon to conclude, that the soule of man suffereth anything in his essence, and thereby to become subject to corruption: it is never altered or changed, neither can it suffer any thing, it is his instrument that is evill affected.[28]

Melancholia and madness may invade liver, heart, and brain, but these are only physical organs of the soul, not the immaterial soul itself. Bright uses the ancient comparison of the soul to a musician, the body to his lute, which if badly tuned gives out discords though the player's skill remains always undiminished.[29] This principle, however, was meant only to guard the soul inviolate from physical change. There was no denial that by passion and by sin the soul undergoes non-corporeal changes in its internal habit and status. Only in this metaphorical sense might the soul be called sick, even in the most mental of mental diseases.

The milder forms of melancholia and mania[30] did not deprive

[28]P. 82. Also Reynoldes, p. 5; Walkington, fol. 12v; Huarte, pp. 90-92.

[29]Bright, p. 38.

[30]Most diseases were regarded by Elizabethans as only mildly and temporarily coloring the patient's outlook, but those settling in the brain and causing prolonged delusions were "dotages." "We call that dotage," said Laurentius, p. 87, "when some one of the principall faculties of the minde, as imagination or reason is corrupted." In advanced stages, melancholia and mania both were abiding dotages unaccompanied by fever or physical obstruction within the brain. The

the will of its freedom, but the severer forms did. All Elizabethans acknowledged this distinction, but nobody of course knew precisely where the dividing line came. On one side of the line, said Laurentius in his text on melancholy, lay the inclinations of natural complexion which being controllable by reason and will were the subjects of moral choice; on the other, melancholia grown to a disease and causing involuntary action not susceptible to moral judgment.[31] But he was sure that even the worst cases of corrupt or 'adusted' humor did not penetrate to the essence of the soul. They merely rendered reason and will impotent by infecting their instruments—brain, heart, and liver. Being a doctor Laurentius then went on to assume tacitly that the whole area of melancholia with which he was dealing was involuntary. No doubt in doing so he had the best of humanitarian motives for absolving the sufferer from moral blame, yet to a captious mind the thought may occur that such an expulsion of the unpredictable will also made his subject easier and more manageable. He chose that part of the field in which, if the manners of soul did not exactly follow the temperature of body, they were at least paralyzed by it.

Not so Robert Burton. To be sure Burton, like Bright before him, agreed at bottom with the prevailing medical view of melancholia as primarily a physical illness with emotional reverberations. He discussed its causes and cure in terms of the usual Galenic list of six "non-natural" factors,[32] although he expanded his analysis of the sixth item, "emotional discontents," far beyond its ordinary scope. But far from concluding that the patient's will need become the slave of his depraved humors, Burton sought instead the aid

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difference between their symptoms was that mania brought with it rage and fury as against the fear and sadness characteristic of melancholia. Mania's causes were "choler adust and blood incensed" flowing to the brain, whereas in melancholia of the worst type the brain "is become too drie and colde," sometimes from an excess of the natural melancholy humor, sometimes from an adustion of any one of the humors into an unnatural state. See Barrough, p. 44; Burton, I, 160-61 and 193; Laurentius, p. 88.

[31]P. 81.

[32]I, 247-87; II, 24-117 ff. For a somewhat too enthusiastic estimate of Burton's anticipations of modern psychiatry see Bergen Evans, *The Psychiatry of Robert Burton* (New York, 1944).

of religion to combat them. On occasion he did trip into some dangerously deterministic language. Usually, however, by arguing constantly for the psychopath's ability to do something to relieve his own misery, by urging him in chapter after chapter to make the effort, by recommending prayer, Scripture reading, and conference with godly ministers, Burton threw his emphasis to the view that most melancholics can rule their ailing bodies. They need God's grace, but he will freely give it if asked. Burton, therefore, though deeply immersed in the medical interpretation of his subject, fell into neither determinism nor religious indifference and achieved perhaps as fair a balance as in this age it was possible to achieve between the demands of medical science on one side and religion on the other. Only we may ask whether after these demands had been met anything remained in the middle for psychology per se.

Science and Religion in Elizabethan England

Besides these problems about the effect of mental disease upon the will arose equally pressing problems about the connections between such disease and remorse of conscience. Elizabethans were well aware that feelings of guilt ordinarily accompanied melancholia. Did melancholia then produce remorse of conscience? Or vice versa? Or, worst of all, was there no real difference between the two? In the latter event, the unwary or malicious critic might easily infer that no such thing as conscience existed, that all self-conviction of guilt in the individual's mind was a mere fume of his melancholic humors. This type of materialistic confusion would destroy the moral self-criticism which was the foundation of the Christian's inner life.

Yet to the great distress of the English clergy the point of view made some headway among the irreligious and the merely muddle-headed. "Some thinke," conceded William Perkins in *The Second Treatise of the Ministerie* (1605),

> ... that all trouble of mind is nothing but *melancholy*, and therefore thinke nothing needes but *Phisicke* and outward comforts: but... nothing can *properly* trouble the *mind* but sinne... so the *good Phisitian* of the soule, must first of all search into the cause of his sicknesse, that is his *sins*, and must take them away, which if they

doe not, then al their labour is lost: for al the company, musick, recreation, wine, diet... cannot so much comforte the distressed soule of a sinner, as this voice *of a minister*, spoken from God upon good grounds, *thy sinnes are forgiven thee*.[33]

The issue evidently went deep into questions of repentance and absolution, and indeed implicated the entire Christian doctrine of sin. John Abernethy, Richard Greenham, and Philip Melanchthon were among the large number of other theologians who expressed their alarm.[34] Greenham, for example, censured the folly of trying to cure a guilty conscience as many do "by drinking at tavernes, by minstrelsie, in merie companie, by purging melancholy in taking phisicke."[35] Such people, he said, were treating the wrong affliction. Remorse of conscience had a spiritual cause and must have a spiritual remedy. *Body and Soul*

Some distinctions between false melancholic guilt and true remorse of conscience obviously were imperative. In making them Christian divines could fall back upon a concept of conscience which was at least as old as Aquinas. Perkins could point out, for instance, that conscience was a function of reason applying the general moral law to the individual's particular circumstances.[36] Being in the rational soul and having no specific organ in the body, conscience could not possibly be influenced by physical malaise. Its verdict of self-accusation or excuse must be right, for God placed it in man as a judge of his daily life. Melancholia, by contrast, was a distemperature of body entailing fear and sadness without real cause. An undue sense of guilt was one of its symptoms. This sense might often superficially resemble true remorse, or indeed be outwardly indistinguishable from it, but the two

[33]Pp. 36-37 in Perkins, *Works* (1605). See also his *Discourse of Conscience* in the same volume, pp. 643-660.

[34]John Abernethy, *A Christian and Heavenly Treatise* (1630), pp. 114-23; Philip Melanchthon, *De Anima* (Vitebergae, 1542), fol. 123v. Babb, pp. 51-53, cites much additional evidence.

[35]*A Sweet Comfort for an Afflicted Conscience* in *Workes* (1599), p. 245; Burton, III, 453, 458.

[36]*A Discourse of Conscience* in *Works* (1605), pp. 619-20. And see nn. 3 to 5 of chap. 2, ante.

radically differed as to source, the one coming from the foul vapors of bodily disease, the other from the voice of the soul.

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Here then was the perennial issue of materialism again in a new guise. Naturally no published Elizabethan treatise, medical or otherwise, came out in defence of the heresy. But judging from the vehemence of the clergy's attack it had a good deal of circulation. And we may suspect that its origins lay in those materialistic trends in medical science which have already been noticed amply. The one psychologist particularly bothered by the problem was Timothy Bright, who as a physician later to turn divine, saw its many-sided implications and tried to work them out at great length in *A Treatise of Melancholy* (1586).

He wrote this wise and tender book to help a friend suffering, by Bright's diagnosis, from both melancholia and a guilty conscience at the same time. To equate the two, or even to think of the former as producing the latter, was in Bright's view to impeach the reality and independence of the rational soul and so to advocate atheism.[37] Pangs of conscience could not come from melancholia.[38] But it was still theologically open to him to observe that the reverse might be true, that hypochrondria might come from the terrors of a smitten conscience. An acute student of human nature, Bright seized the opening eagerly. A restless conscience, he advised his friend, often so stirred the emotions of dread and despair as to cause alterations in the humors, leading to melancholia. Thus there could be a one-way traffic from conscience to mental disease but not back again. The manners of the soul could hurt, but could not be hurt by, the temperature of body. Pursuing these two main lines of analysis, Bright then divided the *Treatise* into parts, one directed to his friend's melancholia, the other to the prick of conscience—one medical, the other theological.

To the medical analysis he gave most of his space, approximately the first thirty-one chapters, treating the causes, symptoms, and cure of melancholia on a Galenic, physical basis. But Bright con-

[37]Epistle Dedicatorie, fols, 2v ff. and p. 38.

[38]Chaps. 32-35, esp. 34.

ceived of this melancholia as not merely coexisting with remorse of conscience in his unfortunate friend but as complicating it. Melancholia distorts consolation offered to the conscience by clergymen, for this must come from the outer world through senses and imagination already depraved. Moreover, Satan takes advantage of despondency to suggest that damnation is inevitable; he encourages curious searching by the mind, panders to self-doubt, and misinterprets for the worst the doctrine of predestination.[39] Hence Bright, feeling impelled to offer his friend religious as well as medical comfort, was led far into theology. Chapter 36 became a consolation to the afflicted conscience on purely religious grounds such as might have been written by Perkins, Hume, Abernethy, or any other theologian. Bright's later entry into holy orders is clearly foreshadowed here. Yet he reverted at the end to a medical note. The four final chapters prescribed treatments for melancholia ranging from recreation and soothing objects of thought to diet, bloodletting, medication, and purges. All these were shown to reduce the humors to normalcy and, by thus removing or abating physical impediments, to make conscience accessible to religious aid. In sum, wherever *A Treatise of Melancholy* was not religious it was medical. Between these two great alternatives Elizabethan psychiatry saw its parts distributed and lost all independence of being.

Finally there was, parallel to the foregoing questions about the power of mental disease over will and conscience, the question about its power over religious faith. Doctors did not fail to notice that psychopaths often developed strange aberrations in belief. In *The Method of Phisick* (1596) Philip Barrough observed that "Many of them do alwaies laugh and many do weepe, & some thinke themselves inspired with the holy Ghost, & do prophecy upon things to come."[40] Andrew Boorde in *The Breviary of Healthe* (1552) was curious about others who thought themselves God, or were convinced that they were damned.[41] Then might not

[39]Pp. 198 ff.

[40]P. 46. See also Babb, pp. 47 ff.

[41]Fol. 78r.

all the varieties of religious experience depend on such and such variations in the mixture and quality of humors? Some sixteenth-century Englishmen evidently thought so. Bright considered them so numerous and consequential that he opened *A Treatise of Melancholy* by stigmatizing them emphatically, though without naming any names. Some, he charged, have judged

> . . . more basely of the soule, then agreeth with pietie or nature, & have accompted all maner affection thereof, to be subject to the physicians hand, not considering herein any thing divine, and above the ordinarie events, and naturall course of things: but have esteemed the vertues them selves, yea religion, no other thing but as the body hath ben tempered, and on the other side, vice, prophanenesse, & neglect of religion and honestie, to have bene nought else but a fault of humour.[42]

Interestingly enough, he then traced their attitude back to an argument based on the power of medicine to cure frenzies, madness, and melancholy. In one sense, Bright's whole book was aimed at refuting this disastrous error.

Certainly here, in this frontal assault upon faith, the dangers latent in what I have broadly called the medical or biological attitude converged and came out into the open. How many people engaged in this assault, and who they were, we do not know. Probably the doctors themselves were less to blame than the free-thinkers who seized and carried to extremes their doctrine of methodological expedience. At any rate, as in related questions of conscience and will, so in this question of faith the Christian answer was clear. The communion of faith is directly from the rational soul to God, without participation of the flesh. The manners of the rational soul do not follow the distemperature of body.

Looking back over the whole field, we may see rather clearly why the Elizabethan clergy and a number of the physicians themselves feared the materialistic and deterministic tendencies of the medical sciences as a group. Most medical works had attained a practical disregard of the soul not merely in its religious and ethical connotations but also in its emotional and cognitive effects

[42]Epistle Dedicatorie, fol. iii v; also pp. 187, 193-95.

on body. Being at a loss to know what to do with incomprehensible spirit, and finding it methodologically expendable in their study of the system of matter, many physicians acted as if it were not there. Psychologists, of course, were in much less danger of forgetting the soul, but they were unlucky victims of the great Elizabethan dualism. Of the two constituents of psychology, matter and spirit, one seemed to belong to the medical sciences, the other to ethics and religion. It is altogether fascinating to watch psychologists veering from one to the other, trying to hold together a topic which persisted in flying apart into halves separated by a metaphysical vacuum. What they needed for a stable subject was a new entity, soul-in-body, distinct from either soul or body, and a resolve to find the laws peculiar to its working. Failing this, most psychologists gravitated towards what seemed the easier certainties and solidities of medical science. Inevitably they took from it some tinge of determinism, some taste of materialism, which they reconciled as best they could with the higher insights of religion or overlaid with not always consistent protestations of piety. A few like Bright, Burton, and Wright digressed far into questions of holiness and virtue or set down the medical and religious points of view side by side, not worrying too much about a possible dichotomy. Seen all together, Elizabethan works on psychology are a phantasmagoria of imperceptibly shifting points of view, so tenuous, intershading, and perplexed that I have been able to give only a simplified outline of them here.

Body and Soul

15

The Grace of God

If the soul's manners did not follow the temperature of the body, what did they follow? To what extent, for instance, was divine grace a cause of human behavior? Our final problem is to consider the soul seen on the one hand by Elizabethan divines as a vessel of God's grace and on the other by psychologists as the chief member of a more or less natural organism committed to the laws of time and place. About the supreme fact that the soul came from God into the flesh and returned to its Maker after death there could be no real dispute between most representatives of the two groups under Elizabethan Christianity, especially since their membership so largely overlapped. About the causes determining the soul's function, content, and status during that brief sojourn, however, there was between the two in some respects a full collision and, over-all, a focus of interest so utterly different as to produce two distinct though overlapping interpretations of human nature.

For divines the only important question about any man was how he stood in the sight of God, whether he was in a state of sin or of sanctity. The prime cause of change from one state to the other was God's grace, with or without the cooperation of man's will, and the change itself went wide and deep throughout the recesses of personality. For psychologists, on the other hand, the question was not so much the human relationship to God as what man was in himself, what were the parts or faculties of his inner mechanism, how he thought, felt, remembered, willed, and whether these processes moved freely or were impeded by some malady. The causes of psychological change were, from this point of view, chiefly the physical complexion, outward circumstances,

and the acts of reason and will; only remotely and secondarily the grace of God. Thus asking radically different questions about human nature and armed with differently balanced theories of cause, divines and psychologists were bound to give rival, if not always directly clashing, answers to the riddle of man.

I

The Grace of God

Elizabethan works of theology[1] considered only three conditions or stages of mankind on earth, all else being irrelevant: the far-off nostalgic condition of innocence and perfection in Eden; the corruption of original sin which all inherit from Adam's fall; and the partial restoration which some enjoy through divine mercy. The criterion of holiness thus became for clergymen the dominant principle by which men were to be classified. And each of the three conditions was described as having its own appropriate psychology, whose nature depended on the presence or absence of grace.

In the state of innocence Adam and Eve possessed a sanctifying grace or original righteousness which turned them towards God.[2] They had the right emotions in the right degree of moderation and under the unquestioned sovereignty of a will which, though free to choose evil, chose always—until the fatal apple—good. This will was served by a faculty of reason clearly perceiving its own nature and that of the surrounding world, understanding too its duties towards man and God.

When man lost Eden he lost also this inner paradise. Exactly how much of it he lost, exactly how pervasive and complete was the change in his psychology, was matter for dispute between the several churches, but all could agree that it had been grievous indeed. It extended, said Calvin, "abroad into all parts of the

[1]For the sake of a unilinear exposition of the religious view I shall try to keep on ground common to the chief Renaissance Christian churches and may perhaps be forgiven some vagueness of terminology in points not directly concerning our purposes here.

[2]Thomas Becon, *The News Out of Heaven* in *Early Works*, ed. John Ayre (1843), Parker Society, II, 46; Edmund Bonner, *A Profitable and Necessarye Doctryne* (1555), fol. 4r; Calvin, *Institutes* (1587), fols. 55v-56r.

soule. . . .”[3] According to the Catholic Bishop Edmund Bonner it “greatelye defiled . . . the whole nature of man, both in bodye and soule.”[4] And for the Church of England it likewise engulfed the entire human being and led to perpetual tensions within him, spared to Adam: “. . . man is very far gone from original righteousness, and is inclined to evil, so that the flesh lusteth against the spirit.”[5]

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Passion, reason, will—all were changed for the worse. Man now had the wrong passions, or what amounts to the same thing, the right passions for the wrong objects or with the wrong intensity. Above them stood a will no longer facing gladly towards God but perversely turned away, desiring only for itself. “Therefore,” said Bullinger,

> since this will doth follow a blind guide, God wot, that is to say, corrupt affection, it is unknown to no man what foolish choice it maketh, and whereunto it tendeth. And although the understanding be never so true and good, yet is the will like to a ship tossed to and fro with stormy tempests, that is, of affections. For it walloweth up and down with hope, fear, lust, sorrow, and anger, so that it chooseth and followeth nothing but evil.[6]

Reason also could give no clear guidance, for it had lost most of its integrity, so that “in the understanding of heavenly matters there is not one small spark of light in man.”[7] To be sure, conscience still had its glimmerings of the truth seen in the law of nature, and our understanding retained some rudimentary knowledge of God. But of themselves such poor remnants did not enable men to fulfill the law and so to save their souls. How deeply original sin penetrated the whole human organism, physical and mental, was summarized by William Perkins in *An Exposition of the Creede* (1605):

[3]Calvin, fol. 74r. Also Theodore Beza, *Summe of Christian Faith* (1589), p. 12: “Original sinne, then, is a full corruption of the whole nature of man. . . .” John Downame, *Summe of Sacred Divinitie* (1630?), pp. 238-50.

[4]Fol. 13r; Aquinas, *Summa Theologica*, Pt. II, Qq. 82-83.

[5]Art. IX of the Thirty-Nine Articles, in Thomas Rogers, *The Catholic Doctrine of the Church of England*, ed. J. J. S. Perowne (1854), Parker Society, XL, 94-95; Alexander Nowell, *The Catechism*, ed. G. E. Corrie (1853), Parker Society, XXXII, 138-39.

[6]*Decades*, ed. Thomas Harding (1849-52), Parker Society, IX, 100.

[7]Ibid., p. 99.

The subject or place of this sinne, is not any part of man, but the whole body and soule. For first of all, the naturall appetite to meate and drinke, and the power of nourishing is greatly corrupted as appears by diseases, aches, surfets, but specially by the abuse of meat and drinke. Secondly, the outward senses are corrupt. . . . Thirdly, touching the understanding, the spirit of God saith, that the *frame of the heart of man is onely evill continually*: so as we are *not able of our selves to thinke a good thought*. And therefore withall, the will of man and his affections are answerably corrupt. . . .[8]

The Grace of God

This, of course, was Calvinism, but our essential point here is that there was no disagreement between the various creeds in their description of what human faculties were damaged by original sin, merely in the extent of the damage to each. None doubted that the damage reached to every faculty. The sense data receivable by man since the Fall, the emotions he experienced, the contents of his thoughts and the decisions of his will, all were depraved from what they would have been had his ancestors never forfeited their birthright of sanctifying grace. Thus original sin, while not destroying the faculties themselves, not only lowered their capacity to function properly but also changed the materials upon which they functioned. And, as we shall see, the totality of this supernatural result made the religious theory of cause in some ways incompatible with psychological naturalism.

True, the impairment wrought by original sin was recognized by theologians themselves as extending with less force to the worldly than to the spiritual activities of the soul. In "the pure knowledge of God, the order of true righteousnesse, and the mysteries of the heavenly kingdome"[9] the natural man's blindness might be variously described as total or at least very grave, and his impotence of action as complete or nearly so. In natural science, however, as noted in Chapter 2, in handicrafts, art, political and household government, in the whole realm of "civil honestie" having to do with the world's daily work and the organization of human society, his powers were enfeebled, indeed, but much

[8] *Works* (1605), pp. 181-82.

[9] Calvin, fol. 80v; Aquinas, Pt. II, Q. 109; Bullinger, p. 98.

less so.[10] Yet even here his motives, if not his powers, were depraved. We have had much occasion to remark how the clergy argued, and scientists themselves agreed, that the natural philosopher must carry on his work in the right frame of mind, with piety for heaven and charity for his fellow man, or his activities partook "of the nature of sin" and were unpleasing to God. This piety and charity, however, could come only through divine grace. By a cognate argument, virtuous heathen who for some reason had never accepted Christianity remained in the bondage of original sin and, however exemplary their outward deeds, lacked the inner component of faith which alone could make their conduct truly good.[11]

Hence, and this is the conclusion to be stressed, the shadow of original sin haunted all the activities, worldly as well as spiritual, of the natural man. It was for theologians the one great underlying principle of his whole psychology. And so it remained until superseded by the equally potent and transforming principle of divine grace.

Although God's bestowal of grace was not considered technically a miracle,[12] it was a supernatural act, invisible, unknowable, unforeseeable. Nothing physical was poured into the soul, but by mysterious means it was given a new form which turned it once more towards God. At one moment a man was imprisoned in that inner misery which is our natural life; at the next, quite beyond all hope or deserving, unlocked by tears, he was transfigured, was stripped of falseness, and, being empowered to reach God, at last came home. Catholics and Protestants agreed that by no thought or work of his own could any man induce the initial gift of grace. It was a free, unmerited act of divine mercy.

[10]Luther, *Commentarie on Galathians* (1588), fol. 91r; Edwin Sandys, *Sermons*, ed. John Ayre (1841), Parker Society, XLI, 24: "...the will of man, being free unto natural and civil actions, hath of itself no freedom to desire things heavenly and spiritual."

[11]See the particularly illuminating discussion in Beza, *Job Expounded* (1589?), sig. B7v-8r; Art. XIII of the Thirty-Nine Articles, in Rogers, p. 125; Nowell, p. 181; Calvin, fols. 80-82; La Primaudaye, *Second Part of the French Academie* (1605), pp. 208-209.

[12]Aquinas, Pt. II, Q. 113, Art. 10, and the whole of Q. 110.

But Catholicism held that after the initial infusion a man must by good works merit further grace through which he rose by stages into blessedness. Many Protestant churches, on the contrary, considered grace the sole cause of his justification, and esteemed his efforts towards good as results rather than causes of the grace conferred.

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Happily, however, there is no need to go into the free-will controversy. The point of interest here is simply that grace, no matter how it came, was by all churches thought of as irradiating the entire character. It calmed and assuaged the passions, rectified the will, opened the eye of reason to spiritual truths, and by cleansing the motives enabled men to practice true Christian charity in their daily lives.[13] So incredible was the change that a person having a justifying grace might be said to be reborn, "a new creature . . . endued with a new nature or disposition."[14] Wherever original sin made its wound—and this was everywhere—grace reached throughout the personality to heal, as Perkins most fully pictured in *An Exposition on the Epistle of Jude* (1605),[15] mind, memory, conscience, will, emotions, physical appetites, and finally the undivided life. Sanctification, therefore, beginning as change in a man's attitude towards the specifically Christian mysteries, spread abroad through his whole nature until he thought new thoughts, experienced new feelings, did new deeds. In its pervasiveness it was total psychological revolution[16] set afoot by a supernatural act of God.

Divines, consequently, kept asking not the psychologists' question, How does this man function? but their own question, Is this man in a state of grace? For them human nature was less a system belonging to a physical order than a receptacle to be divinely

[13]See Arthur Dent, *The Plaine Mans Pathway to Heaven* (1603), pp. 14 ff.; Beza, *Summe of Christian Faith*, p. 63. Almost all the descriptions of original sin cited above carry contrasting descriptions of grace.

[14]Bullinger, p. 101.

[15]Pp. 10-11, in Perkins' *Works* (1605). This, the most systematic analysis I have seen on the subject among the English theologians of the period, is unfortunately too long to be quoted.

[16]Total in the sense that it penetrated everywhere, but not, of course, in the sense that it made every man instantly a saint.

filled. Accordingly, they showed almost complete indifference to the theory of complexional types which crowded the texts of the psychologists. Complexion sprang from body, and body was a natural cause inappropriate to the description of spiritual states. Much meddling with it, asking the question they did, would have led divines to the unthinkable result of explaining in terms of physical cause those attitudes of soul which could come only from the supernatural cause, grace. On all such naturalistic theories of psychology the churchman looked with the same either openly hostile or obliviously blank stare sometimes directed by scientists at the claims of the supernatural.

II

And now what of the psychologist? That God as the sovereign First Cause created and activated all the secondary, more or less natural causes forming human nature was, of course, an article of faith for all Christians, and all Elizabethan psychologists, so far as appears, were Christians. Even Laurentius, that most austerely medical of psychological writers, opened his book with a pious acknowledgment of this kind,[17] and the same idea was very fervently and ungrudgingly returned to again and again by Burton, Bright, Wright, Lemnius and the rest.[18] This tone of devotion was stronger in the psychological than in the strictly medical writers, for the good reason that the former habitually dealt not only with the body but with the soul, whose religious connections were more immediate. Moreover, discussions of passion and volition led easily to remembrance that God must be the summum bonum of all endeavor. Thus there was every occasion for psychologists to remain mindful of God as First Cause and final end.

But with almost equal inevitability they tended to avoid recognition of the presence or absence of divine grace as the grand

[17] *A Discourse of the Preservation of the Sight* (1599), chap. i, pp. 1-9.

[18] Robert Burton, *The Anatomy of Melancholy* (1651), ed. A. R. Shilleto (1896), I, opening pages of Partition I, pp. 149 ff.; also pp. 188, 203, etc. Timothy Bright, *A Treatise of Melancholie* (1586), pp. 37, 187, 190, 193 ff.

causal principle of any given psychological condition. And their reason, perhaps not consciously stated, was that grace was a form of supernatural intervention into the more or less natural system they were studying. The basic need of psychologists was to see the human being as an order functioning steadily and understandably. To them man must be an organism which, though partly inside (as body) and partly outside (as soul) the system of strictly natural laws, yet worked by principles of its own and was at least not supernatural. Causes coming from the body, including those entering via heredity and the stars, interacted with those coming from the outer world and from the self-created acts of reason and will. Man was thus and thus in himself. Sanguine, choleric, phlegmatic, and melancholic types had such and such traits. And since internal process rather than external relationship with God was the question, sin and grace seemed really beside the point.

The Grace of God

Consequently, in theological claims for the inner revolution caused by grace, psychologists confronted a problem somewhat like that of a physicist faced with a supposititious miracle in the stars or like that of the doctor treating a disease said to be miraculously imposed. Such things interrupted the order of nature—in this case, of human nature. They were indigestible, unscientific. But the problem of the psychologist was aggravated in that miracles in the physical order were acknowledged to be rare, whereas grace could and did happen every day as God drew to himself his chosen, no man knew how or when.

Psychology could more easily have coped with original sin alone if it had been regarded as a universal and continuing condition. But sin implied grace, and grace in its varying degrees, its infusions and recessions, implied the inexplicable and the discontinuous. Furthermore, its force could not be quarantined in some small corner of the psyche, leaving the greater remainder free. It transformed the whole spiritual character, and what bounds could be set to the spiritual? The new man, as we have seen, was new clear through, in thought, memory, feeling, will. The old content of his mind and emotions was either displaced

entirely or set in so new a context that it underwent metamorphosis as life took on for him everywhere a meaning, and a purpose, and a peace. So great a new departure, springing from an unknowable cause, could not be either isolated or adequately dealt with by the secular psychologist.

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Therefore it must as far as possible be overlooked—not altogether, of course, but mentioned only in passing, here and there. The bulk of the psychologist's attention remained fixed on the more or less natural causes and processes within the soul. He continued to divide men into complexional types, not into types of sanctity and sin. God was ultimate cause and purpose but not the major immediate, operating cause. Thus the psychologist tended to expel the divine from psychology's core to an outer perimeter where it ceased to be a practical consideration, just as physical scientists tended to expel miracles. Within the core were then left body, reason and will, and environment, to which varying emphases might be given, as noted in the preceding chapter. Hence the terrible restlessness of the psychologists. When they did not give, from the ethical viewpoint, too much to body, they were likely to give too much to the self-sufficiency of man's will and thus to write like Pelagians, or at least like Catholics rather than Lutherans or Calvinists. Herein they resembled the ethical philosophers of classical times and many Renaissance humanists, who likewise attributed much power to the human will, for the purpose of safeguarding moral responsibility and the human drive towards virtue.

Indeed the dividing line between the psychologist and the moral philosopher was for the Elizabethans thin, at most, or nonexistent. Many passages in Burton, Wright, Coeffeteau and their like merged over into ethics. This was, of course, one phase of their acceptance of the religious faith, already remarked, that the soul which was the subject of their studies must seek a return to God as its final end. Nor did this idea infringe fundamentally on their concept of human character as a self-contained, naturally functioning order, for the evaluation of its state as good or evil could be simply superimposed on the description of its processes.

No change of causation was involved. Only when they mentioned the need for grace to help the will in its choices did they add an alien element of supernatural cause. But it is important to observe that they usually mentioned such grace as an aid rather than as the primary determining factor in the decision, that they gave it relatively inferior emphasis, that they did not hold it to be a principle reaching down through the whole personality as a transforming cause. If questioned on these points relating to the definition and effects of grace, Bright or Burton or almost any one of the others would presumably have come up with orthodox theological replies, but as psychologists they were under the tyranny of their subject and followed where it led.

The Grace of God

Let us look a little more closely at their writings without, however, repeating the book-by-book analysis of the previous chapter. Sir John Davies in *Nosce Teipsum* (1599), after first speaking cogently of man's ignorance through original sin, proceeded to dilate on all the faculties of the soul and their workings.[19] Under sin? Under grace? Davies did not say. Neither did Raleigh when he described man's mental powers and processes in *A Treatise of the Soul*. Coeffeteau (a surprising case) did not bring up the subject at all in his opening summary of the soul.[20] Anthony Nixon's *The Dignity of Man* (1612) pictured in full the ways of human imagination, reason, volition, and so forth, yet gave no inkling of the state of grace or sin supposed to be under discussion.[21] One is tantalized by this silence in all these writers and many like them, until realization comes that they thrust the question out of mind for the moment in order to describe man naturalistically. Some writers like Lemnius showed at the outset the ruin caused by original sin, only to forget it in the rest of the book except during an occasional pious interlude.[22] On a related point, Huarte excluded miracles from psychology, argu-

[19]Compare the introductory section, "Of Humane Knowledge," with pp. 110-24 in Sir John Davies, *Works*, ed. Grosart (1876).

[20]See the Preface, esp. sig. A7r.

[21]Pp. 31-51.

[22]Fols. 14r & v, 60v, Cf. Thomas Wright, *The Passions of the Minde* (1604), pp. 2, 88.

ing that men know what they know by the natural media of body and brain, not by sudden inspirations from God.[23] Perhaps symptomatic of the separation of religion from science in all such treatments was the failure of Spenser's Sir Guyon to encounter any religious symbols in the apartments of Alma, these being reserved for the Red Cross Knight in the House of Holiness.[24]

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In like manner, Bright, Burton, and Laurentius distinguished the several species of melancholia according to the physical causes of each – the kind of humor 'adusted' or in excess, the organ affected, and so on. None of these writers classed his hypochondriacs according to their possession or failure of grace. That is, they made natural complexion, not supernatural wrath or mercy, the determining source of the disease. In this light human personality seemed a fundamentally self-bounded order, to which grace served as but a foreign and incidental addition. And the recommendations of Burton and Bright that the patient should appeal to God for grace[25] sounded like no more than exalted medical prescriptions.

III

We are now better equipped to raise the tangled question whether Elizabethan religious and psychological theories of cause in the human being did really clash with each other, and thereby to uncover the ambiguities which for the sake of initial simplicity have been allowed to lurk in our whole exposition so far. Such theories may be said to clash when they explain the same thing in different ways. First, then, were the two theories attempting to explain the same thing? The clergyman was explaining a spiritual state whereas the psychologist limited himself to what was secular. Did they not therefore operate in completely different areas?

Partially, yes. Some states, such as faith in God, stood out as

[23] *Examination of Wits* (1594), pp. 13-19.

[24] *The Faerie Queene*, Bk. I, Canto 10, and Bk. II, Canto 9.

[25] E.g. Bright, chaps. 35 and 36; Burton, III, 458.

purely spiritual, while others, such as the attitudes accompanying many of the ordinary details of daily work, might be taken as purely secular. But there was a large nebulous no man's land, or every man's land, between them where jurisdictions overlapped. Thus charity was for the clergy an inner spiritual condition and, in the very wide definition they customarily gave it, extended to the motives behind most actions affecting one's fellow man. Natural science, for example, was a secular activity, but it became also spiritual in the feelings actuating it, feelings selfish or unselfish, proud and impious, or humble and devout. Similarly, from the intellectual side, what the scientist knew about the facts of his subject was in itself spiritually neutral, but the bearing it had on his other beliefs, the place it took in his entire scheme of comprehending the meaning of the universe, carried a strongly positive spiritual charge. Consequently, between the avowedly spiritual and the undoubtedly secular at either extreme there lay a wilderness of emotions and ideas which might be explained by either party in terms of its own theories of causation.

Now, second, were these theories really different, and if so to what extent? Sin and grace operated only upon the soul, directly and immediately, not through physical complexion or external stimuli. Psychological theories of cause, as we have noted, summoned not only the soul but also the body and incursions from the outer world to account for human attitudes. But psychologists differed so radically among themselves in their recognition of these several factors that they may be said not to have been able as a group to make up their collective minds what their theory of cause was, except that it was naturalistic rather than supernaturalistic. In so far, therefore, as any given psychologist might emphasize body as the sole or prime cause of a condition which the clergy claimed as spiritual there would be a head-on conflict. Or in so far as the psychologist might assign reason-will as the cause but fail to recognize or emphasize the supernatural orientation lying behind the attitudes of reason-will, there would be conflict by omission, perhaps no less severe than the other. Similarly, if divines interpreted in terms wholly of sin and grace a

condition which any given psychologist thought to be due wholly or primarily to body or to some habit in reason-will stemming from custom and education there would likewise be an essential conflict of explanation.

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The changes might be rung further on the combinations of these various elements. All that needs to be understood here, however, is that the psychological and religious theories of cause were in some cases different explanations of the same things, ships colliding head-on, whereas in other cases they were different explanations of different things, ships sailing on separate oceans. And the occasions and nature of these collisions were ill-defined, perhaps ill-understood, by the parties on either side. One could wish the situation simpler, but since man is complex nothing in the Renaissance doctrine of man could be anything but complex.

Despite this confusion in the intermediate areas, one thing is clear. Writers on psychology did not think it any affair of theirs to define or trace the causes and effects of those attitudes of the rational and sensitive soul towards its God which could be plainly recognized as constituting faith, hope, and charity. These they surrendered to supernatural cause and left to the divines. Since the psychologist's theory of natural cause leaned heavily on bodily complexion, any attempt to apply it to these purely spiritual conditions would have meant explaining them in terms of body, with materialistic consequences of the worst kind.

In the previous chapter we have looked at this matter in some detail, showing that psychologists like Bright, Burton, Wright, and Laurentius were as zealous as anybody to reject current interpretations of conscience, will, or faith as mere slaves of the body's sound or unsound temperature. Indeed no Christian who understood the issues could do other than join with the clergy in repelling efforts to apply naturalistic causation to the highest spiritual states. Shakespeare, for instance, knew what was at stake when he wrote the sleepwalking scene in *Macbeth*. The Doctor there diagnosed Lady Macbeth's horrible plight as an indictment of conscience, not melancholia, and therefore prescribed for her none of the diet, purgations, and phlebotomy recommended by

his science for the latter disease. Instead he left her case to the clergyman, recognizing that since her illness was spiritual the remedy must be so likewise: "More needs she the divine than the physician."

IV

The Grace of God

While the Elizabethan psychologist thus tried in the more clearly definable spiritual conditions to give to God what was God's, it is equally clear that the divine freely borrowed from the psychologist many elements in his description of each of those conditions. From contemporary psychology obviously came the theologian's whole concept of what the several faculties of the soul were and how they synchronized in the organism.[26] Whether a man was in a state of sin or of grace, he still had an intellect, a will, emotion, and so forth, and once theology had defined each state it still was obliged to learn from the psychologist how the various instrumental processes functioned within each. Now a process is a series of causal acts and consequences. So within the larger framework of their own supernatural theory of cause, divines had to adapt as well as they were able those portions or versions of naturalistic theory which could be rendered consistent with it. Every theology required a psychology. By and large, psychological naturalism was sure to supply many of the terms in which theological problems touching the nature of man were conceived.

To conceive a problem in certain terms is half to answer it. Any historical study of the evolution of Christian thought would show how the particular form taken in each era by the perennial issues of reason and intuition, free will and predestination, faith and charity, and the like have in some degree been molded by, and in return have molded, the prevailing psychological theories. What Elizabethan theology might have been under some different system of psychology no one need venture to guess, but surely

[26]See for example Calvin's discussion of the faculties of understanding and will, *Institutes*, fol. 55r & v ff., and Luther's in *Galathians* of the psychological meaning of faith, hope, and charity, fols. 132v, 139, 240 ff., etc.

not what it actually was in many of its details. Yet in order to remain a theology it would have had always to retain in some form its theory of supernatural causation. At any rate, most of these issues had been thoroughly defined on the Continent before our period opens, and it remained for Englishmen only to work out the implications of the various alternatives in adaptation to the Elizabethan scene.

Science and Religion in Elizabethan England

Psychological theory was also useful for what one might call applied divinity, the problems faced by the minister in bringing his people triumphantly through states of error like carnality, hardness of heart, or despair to repentance and regeneration. Here a knowledge of the interior processes of passion, will, and reason, possibly eked out by a little acquaintance with humoral medicine as in the case of Burton, Gyer, Harward, and many others, gave the clergy an indispensable means of interpreting, within the limits then possible, the complex welter of human experience. Much of this practical wisdom, of course, would have been gathered and used under any theory of psychology or under no theory. Empirical observation and practice need not depend on a consciously articulated system of ideas about behavior. Still, as in other fields of activity, possession of a system, even a false one, helps to organize and extend the data assembled. It seems true that divines understood human nature the better because of the psycho-ethical theories since Plato. At any rate, they had fairly clear ideas for guiding it.

In review, the religious doctrine of sin and grace takes shape as one facet of the general doctrine of Providence. Every man was expected to use all means such as prayer, church attendance, good reading, good company, and self-discipline to attain grace, though the means might unpredictably be ineffective. Grace once attained produced in the organism of sinful man an entire reorientation and renovation of faculty and content. It was like a miracle, fundamentally not to be understood. But science is nothing if not understanding, and is diminished by each miracle it must acknowledge. Therefore, as in the macrocosm the Elizabethan scientist tried to overlook or explain away in terms of natural cause

each presumptive miracle, so also his colleague of the microcosm tried, not to deny grace, for that was rankest atheism, but to omit or understate it. The psychologist spoke much, indeed, of how God was man's origin and final goal, for he could tolerate mystery in what man has been and shall be, if not in what man is. But in the contrast between the psychologist's cult of the understandable and the clergyman's concentration upon the daily miracle of grace as the supreme work of divine love shines in epitome the chief conflict between Elizabethan science and religion.

The Grace of God

16

Last View

TEMPTING but vain as an alchemist's dream would be the search for any single formula to enclose the whole interrelationship of Elizabethan science and religion. There is no easy escape into simplicity. The facts remain large, complex, and stubbornly irreducible. Now at last, however, we can perhaps see their main contours more clearly.

Natural science comes from God and must return to God again. As accepted by the main body of Elizabethan churchmen and by the great majority of scientists, too, this was the umbilical cord binding science to Christianity. God sows in man's soul certain innate principles which allow him to earn accurate and valid knowledge of the physical world. The Fall did not radically impair this power. Then men do well when they use the gift to discover the giver, and to act his will. They should see behind nature's order the face of God. Loving their neighbors as themselves, they should engage in science not out of pride or thirst of intellect but in the spirit of charity, turning their discoveries to the good of their fellow men. Science should never become an end in itself, never cut free from this religious frame of reference. For if it did, the consequence of dealing exclusively with second causes would be neglect of the whole realm of spirit under God. Then would follow materialism; then atheism, the final horror.

If we believe their own repeated statements, most Elizabethan scientists did not find this religious sanction particularly onerous. It gave the scientist as a man great ardor and security of motivation. He could feel that his work fitted into a scheme, serving at once both God and man. And he had no basic disagreement with the clergyman as to what the limits of that work should be. Science

was to deal solely with the system of the physical world after its creation and before its end. Religion defined the purposes to which God put that system and all creatures in it. Disagreements between scientists and divines about judicial astrology, alchemy, and natural magic were mere fringes on this larger harmony. The two groups were simply disputing about what was natural. Divines turned out to be right in astrology. In alchemy and natural magic the struggle might be called a draw. Wherever in the latter fields science was at length able to demonstrate a natural law, the Church withdrew its objections. Nor, in England at least, does its resistance on such points seem ever to have been very severe. No doubt a few scientists pursuing what they deemed legitimate research in alchemy and natural magic were branded as in league with Satan. But these cases were minor in importance and number compared with the general respectability enjoyed by scientists in all the main areas of investigation.

Last View

Only slightly cramping to science, too, were the efforts of divines to lash human pride, bring home the need for immediate moral reform, and keep in men's minds a proper sense of their limitations in the face of the abiding mysteries by reminding that the world would soon end and that the unknowable was vaster than the known. Such reminders still left plenty of room for scientific energy. And they did not challenge the propriety, in fact the duty, of giving it full play.

In the main structure of Elizabethan thought, then, religion and science were firmly married and supported each other, though there was never any doubt as to which should have the upper hand. But Christianity itself harbored minority parties who took the fideistic position that the two must be separated in the interests of faith. To fideists science seemed a contamination of religion. The Christian must rely not on sense and reason but on faith alone. Here stood those divines, like Rollock and his kind, who scorned all human knowledge as a hindrance to faith. Here also stood the lay skeptics like Fulke Greville, who today would probably be attacking Christianity itself but then defended what they considered a purer piety at the sacrifice of sense and reason. The

movement was in fact dangerous to both faith and science. It left science dangling without a base in religion, and the scientist without the push and guidance of pious motives. It also left Christianity without the support of science's exegesis of God in nature. In fine, fideism, whether in the garb of classical skepticism or of Christian otherworldliness, posed the chief philosophic threat of the day to the prevailing union of religion and science. As such it failed to convince most Christian theologians of all churches, who continued to believe that the two belonged together.

Science and Religion in Elizabethan England

At the other extreme, pressure to dissolve the union, or at least to revise it on terms more favorable to science, also developed subtly but increasingly from the methods of science itself. The natural could better be studied if the supernatural were left out of account. Indeed the only kind of activity by spiritual factors such as God, Satan, and the human soul which did not curtail the scientist's study of matter was a regular, predictable, animating activity—in short, one which expressed itself as a natural law. Even this regular spiritual direction behind the scenes he did not need and therefore found easy to ignore. Stronger still, of course, was the Elizabethan scientist's urge to limit or deny any irregular interruptions of the natural order by or for spiritual purposes, any miracles. Hence the paradox of the personally devout student of nature skimping on the supernatural wherever possible. He meant nothing ultimate by it; he was merely making some convenient and apparently temporary exclusions for the ease of his subject. But the attitude was insidious and could quickly get out of bounds.

The contrasting needs of religion came out particularly clearly in the doctrine of Providence. As against science's optimum demand for an exact natural order, religion wanted a completely providential order, one which could be broken by miracles and new starts, one which was directed by the Almighty to man's moral schooling and ultimate salvation. To the Christian, no absentee God seemed worthy of worship; no Father bound by a rigid predetermined order of nature could spontaneously answer the human cry of prayer. With this doctrine, in so far as it

proclaimed God's existence and personal ordering of the world for mankind, the scientist had no reason to quarrel so long as the ordering remained regular in pursuance of natural law. On the other hand, the idea of a divine plan was in no way useful or necessary to science. And of course the fewer miracles the better. Thus in astronomy and meteorology the Elizabethan scientist concluded after some hesitation that there was nothing preternatural about novas and comets above the moon, or about the earthquake of 1580 and other phenomena of the sort. In medicine he discouraged his patient's hope for miraculous cures and the flouting of quarantine regulations. In psychology he favored naturalistic cause at the expense of divine grace.

Last View

This power to dispense methodologically with all save second causes led an indeterminate, probably quite small, number of scientists and their followers through various stages of indifference or neglect to outright denial of a First Cause. Short of these drastic but infrequent results the usual effect of science was somewhat to depersonalize Providence and to picture God as working through nature rather than by immediate visitation to men. But most scientists of the age remained devout and continued to admit the possibility of some miracles, while most clergymen went some distance toward wariness in the canonizing of new wonders. With this difference in emphasis a kind of balance was achieved midway. And neither side as yet felt that it could not bear to live with the other, or indeed that there were really two separate, mutually antagonistic sides at all. The estrangement was to come later from those who built the presuppositions of scientific method into a philosophy.

In the same way Elizabethan science also crowded against those other parts of the Christian doctrine of spirit which described how devils operated in matter, and the soul in the human body. As physicians and the intellectuals who shared their approach rescued for naturalism more and more of the physical events formerly credited to the demon through the witch, the belief that diabolical spirit could make such events happen at all was on the way to being discarded altogether. Theologians in general did not mourn to

see it go. In fact many of them aided in the process by lopping off some of Satan's powers and confining the rest to what he might do by manipulating nature. A few divines like Harsnet were even willing to banish him completely to the world of spirit. In culmination, modern Christianity has largely succeeded in shaking itself free from demonology without real loss, rather with much profit. Internal deviations of the human soul provide all the evil needed in our world.

Science and Religion in Elizabethan England

Upon the soul itself Elizabethan science made no such outright assault, and of course met with no such cooperation from divines. Most medical men merely found it inconvenient to pay much attention to soul as a factor in physical disease. And following the same tradition most psychologists, discussing with bewilderment the joint body-soul conditions of cognition, passion, or mental disease, took the easier course of stressing the relatively known contributions of body as against the relatively unknown contributions of the soul. Thence the suffusion of Elizabethan psychology with medical concepts, the quiet, age-long insinuations that men are but creatures of the dust. The resulting drift towards materialism in both fields, though not to be exaggerated, was real enough to justify the fears of the clergy. At its rare worst the consequence was either a complete disbelief in the existence of any soul or an equally fatal belief that its highest religious and ethical attitudes were determined wholly by body and environment. Judicial astrologers seem sometimes to have been guilty of this extreme. But the great majority of both doctors and psychologists refused to fall victim to their own professional methodology. They could take it up and lay it aside as an instrument useful in isolating one segment of the total truth. They did not mistake it for that truth.

The exclusion of supernatural cause and purpose which scientific method fostered even in the sixteenth century has of course grown since then much more remorseless and complete. And, spreading into modern attitudes far outside the sciences themselves, it has come to be widely accepted by many minds as a full account of reality, not as a mere means of studying an aspect of

that reality. To this materialism the Christian answer is now what it was in the sixteenth century and always has been. All situations in our world are physico-spiritual, spirit acting through matter. Since science deals merely with matter it abstracts only one element of this whole. It may legitimately do so for purposes of more convenient study. But to dream that it exhausts the whole is to underestimate grievously the fullness of reality.

Apart from these general questions of methodology, Copernicanism at the start of the seventeenth century was beginning to open up certain special problems for faith. The new universe seemed to require a new conception of man's role in it, and of his importance to God. Could human beings, representing perhaps only one among many possible forms of rational life, inhabiting just another planet in just another solar system, tiny, insignificant, lost among the galaxies, possibly be the creatures for whom God made the world and directed the course of his Providence? The Elizabethans barely glimpsed the full dimensions of the problem. It was left for the later seventeenth and the eighteenth centuries to accept the need of abandoning the old arrogant notion that the universe was made wholly and exclusively for man. The reaction in some minds has been towards an excess of self-abasement, as dangerous in its way to religious faith as the opposite excess of proud independence, with which it is often strangely mingled. Christianity has perhaps not yet plumbed all the potentialities here. But in the main it assures both the discouraged and the disdainful that they remain irreplaceably, though not perforce solely, important in the divine sight. God is mindful of humanity and its world even while mindful also of numberless beings among the spiral nebulae. What if man's world be small and subsidiary, man himself a mote in infinite space? Centricity, size, numbers, singularity are no criteria of the values of the spirit. The vital thing is that man is made in the divine image, possessed of a soul communing with God and accountable to him. God cares, and expresses that concern in his response to prayer.

About the advances of modern science and their relevance to religion others are more competent than I to speak. But perhaps

in conclusion a few brief parallels between the modern and the Elizabethan situations may profitably be drawn. Recent physics has presented us with a new universe of relativity and space-time, and almost a whole new cosmos within the atomic deeps. These changes do not stagger Christianity, which can adapt itself as well to the Einsteinian as to the Copernican or to any other world. No more than his sixteenth-century ancestor can today's scientist pretend to say who created this universe and why, who directs it and to what end. Explanations of these questions lie, as before, within the realm of the doctrine of Providence. Nor does any finding of the new science necessarily rule out the possibility of miracles, defined as sports or physically uncaused deviations from a previous chain of events. Science may be able to explode this or that individual proposed miracle. But it knows too little about physical nature, much less human nature, to assert that miracles never occur. Until man as scientist understands the cosmos as a whole, finds in it an order everywhere unbroken, and is able to relate every event sequentially to this order, man as worshipper is free to believe in miracles. That day of omniscience will not come soon. But perhaps the believer may have to be content more often with quiet miracles instead of big resounding ones. The unseen shift within the atom, the apparently ordinary thing happening without noise in his daily life may be in fact without antecedent natural cause and spring unperceived as a new creation from the hand of God. For this idea science's new principle of indeterminacy seems indeed to show some sympathy. However that may be, the concept of divine Providence meets the conditions of the new cosmology and physics as validly as it met those of the Ptolemaic and Copernican, and is just as essential to their ultimate interpretation.

Science and Religion in Elizabethan England

Modern biology and psychology also ask in new and perhaps more urgent forms the ancient Elizabethan questions whether man has a rational soul at all and, if so, whether its manners follow automatically the make-up of his body. For example, biology seems to have narrowed the gap between men and other living creatures; also between the animate and the inanimate.

Whether this gap will ever be completely closed, even in purely physical terms, of course nobody can tell. Suppose that it were, and that the human body could be shown to have arisen in unbroken sequence from the first chemicals of the earth without intervention of any save natural causes. Nothing would properly prevent the devout from continuing to believe that the whole marvelous process was guided by a divine intelligence, which in due time endowed the body with a spark of his own spirit, with reason, conscience, and will. Certainly, whatever the biological continuity of man's body with that of the lower animals, he seems essentially different from them in these endowments. If he is not, if in their own degree they share his faculties of mind and worship, then the alternative is to extend rational and immortal soul downwards from man instead of reading it out of existence altogether. The point I am trying to make, then, is that the perennial Christian view of man as a rational figure gives necessary meaning to the theory of evolution and to modern biochemical research without being in any way inconsistent with them. Heredity, racial and individual, does no more than supply the tendencies ruled by will and reason in their decisions for righteousness.

Present day psychology indeed paints no pretty picture of the welter of the subliminal unconscious. But Elizabethan religion, as we have seen, was quite aware of the ugliness of uncontrolled and unredeemed human nature, and ascribed it to original sin. Just so, Christianity today can freely accept any number of psychological constructs such as libidos, complexes, and defense mechanisms, asking only why all these, in any situation having a spiritual bearing, may not be taken as subject finally to the veto of the rational soul. What piety cannot well countenance is any attempt to make these subrational elements the whole man. Such attempts have occurred periodically down the ages, always with the aim of construing the human being as either a mere beast or as some variety of physical or neural machine. We have witnessed the Elizabethan version. There is no greater reason today than yesterday to believe that the manners of the soul need follow either the ferment of the unconscious or the genes of the body. Those who

hold such beliefs must do so on other than scientific grounds.

Most modern problems of interrelating science with religion in ideas of the cosmos and of man are therefore only old issues with new faces. Much clarity can come from seeing them in the perspective of the past. The Elizabethan solution was, I am convinced, fundamentally sound. Science must not run amuck but must remember God as its source and its final end. Scientific method is a device only, not a philosophy. Forgetfulness of these truths, less by the scientists themselves than by their interpreters, has been a prime cause of the rudderless wanderings of the modern soul. Sharply needed, therefore, is a new *Summa Theologica* to absorb the accumulated stores of science and relate them to the general framework of religious faith. Without such a synthesis we rebound blindly between faith and science, either surrendering our deepest religious instincts to satisfy our minds or crucifying our intellects in the hunger to believe.

Science and Religion in Elizabethan England

The new *Summa* would show the evolution of religion as well as that of science, for the two have gone along step by step together and interacted constantly. Yet perhaps the changes, in religion at least, are largely on the surface. At the heart of religion, safe inside the flux of history, there remains a peace which is a gift of the eternal to those who must live in time. And the whole long drama of science and religion, with their pressures and counterpressures, their clashes, reconciliations, and deep persistent mutual aid, may itself at last be subsumed under the doctrine of divine Providence. They appear as successive stages in the self-revelation of one whose will, through discord or concord, always is done on earth.

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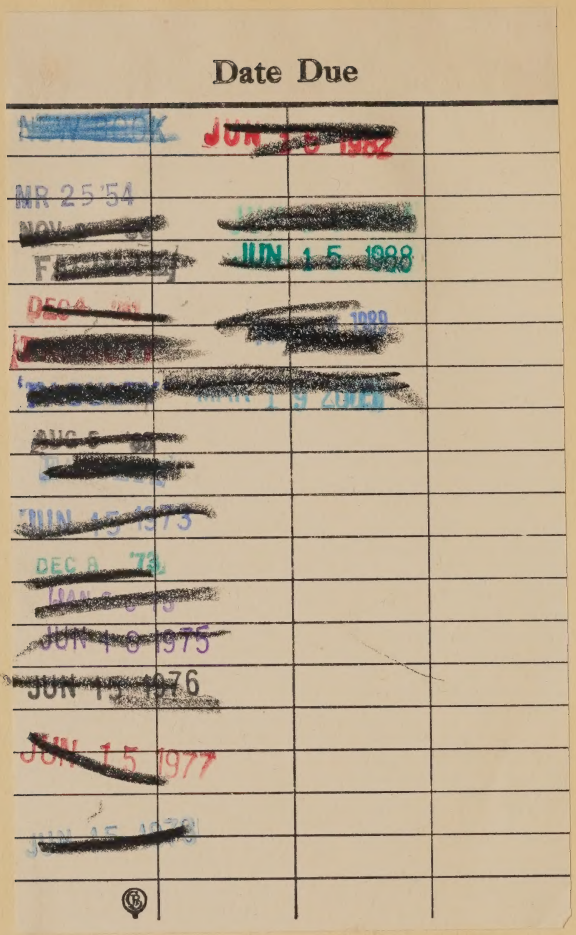
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